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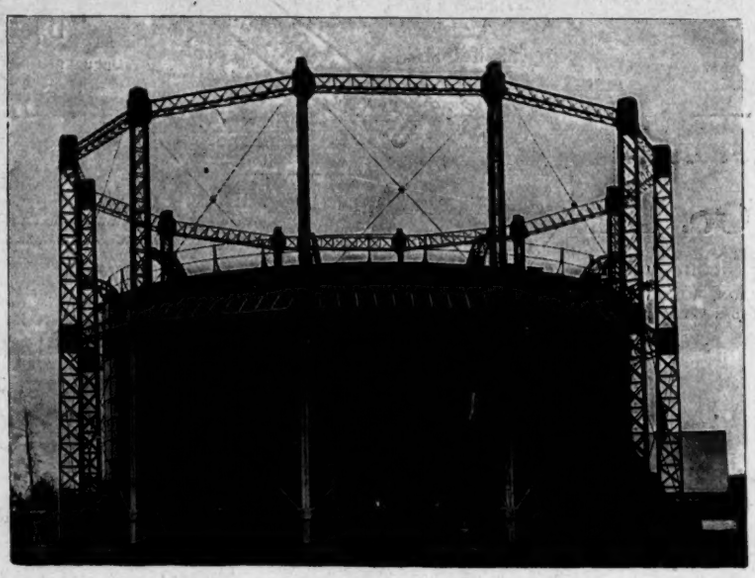

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VOL. CXXXVIII., No. 2817.] TUESDAY, MAY 8, 1917. [69TH YEAR.

EDITORIAL NOTES.

Recruiting Officers and Uncertified Undertakings.

THE new Schedule of Protected Occupations was the subject of speeches and discussion after lunch at the meeting last Thursday of the Eastern Counties Gas Managers' Association. The discussion was brief and very much to the point, and it was between Mr. F. W. Goodenough and Mr. R. G. Shadbolt. It was over the use in the schedule of the very unfortunate word "certified" in relation to gas undertakings. Mr. Goodenough reiterated the assurance that we gave in last week's "JOURNAL," that the Ministry of Munitions would treat as "certified" concerns all gas undertakings with badged employees, or which were contributing to the output of munitions work. The point, however, of Mr. Shadbolt's remarks is that it is all very well to have such assurances; but the local recruiting officials with whom gas undertakings have to deal will not shape their course of action on such assurances without they are supplemented by a direct official intimation from headquarters as to the line they are to take. Meanwhile, to them the words of the printed schedule are law. "'Certified' you must be, or "I must sweep you in as being among the unprotected." This is the sort of thing that is being met with by gas engineers. The official notification as suggested by Mr. Shadbolt would straighten out the matter; and Mr. Goodenough promised that the attention of the National Gas Council should be at once drawn to the matter, with the view of relief from the trouble being obtained.

A Gas Engineer Adviser for the Coal Controller—Economize Your Gas Coal.

THE Coal Controller (Mr. Guy Calthrop) is proving himself an excellent organizer. He is not trusting to his own unaided abilities, high and fertile as they are; and he is not following the precedent set by the old Board of Trade *régime* (which precedent entirely miscarried in its effects) by attempting to organize the coal supplies of the country merely by the quizzical system of Committees composed mainly of coal proprietors. He recognizes that his duties reach further than the limits implied by such an arrangement, and that the interests he has to serve extend beyond the horizon of any one man's knowledge and experience. The Coal Controller has therefore assembled about him a band of expert helpers who know the requirements of the principal consumers of the country—industries especially—as well as men who can assist him on questions affecting both supply and transport. By this systematic organization, he is, through these diversely specialized advisers, in touch with everything from source to actual consumption. He has, gas men will be interested to learn, directly linked himself up with the gas industry by appointing Mr. Thomas Glover, of Norwich, to act as his immediate counsellor; and it will be generally acknowledged that the selection is excellent, for Mr. Glover has had a varied experience with the gas coal supplies of the country, and few gas engineers have done more than he has in the way of personal study of carbonization problems, as well as those associated with latter-day developments in connection with the demands upon the industry by the Ministry of Munitions. The work Mr. Glover has taken upon himself (with the generous consent of his Directors) will entail his absence from Norwich several days a week; but the fact that a gas engineer has been placed in this official position must not lead other gas engineers to expect that he is going to work miracles. He cannot do so; he has no power over conditions. What he can do, and what we take it it will be his duty to do, will be to collect information and advise as to what is best to be done in the endeavour to reconcile as far as possible the circumstances of supply and distribution with those of requirement—keeping at the same time his eyes upon national interests as well as those of the gas industry.

To an extent Mr. Glover's work (arduous as it will in the aggregate be) is eased by the fact that the gas industry has a splendid case in that, while making large contribution to supplies of first importance for the war, it is a no mean subscriber to the economic conditions of the country. From the coal it uses, it distributes gaseous fuel without road surface transport; half the weight of the coal carbonized is available for the local markets as a smokeless fuel; its tar, sulphur, and other products are needed for the sustenance of native industries; and there is the fertilizing agent of which the country stands badly in need, and more so every day U-boat activity is successful. No other coal users have as good a case. But with all this, there is a claim upon the gas industry for every possible economy in the use of coal, in view of what all authorities believe is approaching, and that is, with the end of summer, a worse condition than ever in respect of coal deliveries, through the pressure on our much depleted railways, owing to shortage of rolling stock and the dangers at sea. In an after-luncheon speech at the meeting last Thursday of the Eastern Counties Gas Managers' Association (as reported elsewhere this week), Mr. Glover lifted a corner of the veil upon one part of the work on which he is engaged. He is investigating the question of the abandonment of the use of water-gas plants; and he finds that this has been, through the heavy price of coal, a somewhat considerable proceeding. But we rsad in his words that this must not be. The matter has to be looked at in its proper perspective. Coal must be reserved against the possible worse times coming; and every helpful resource must be made use of to this end, although it means a deviation from the habitual course. Water-gas plants everywhere should be put into use—at once—for the making of blue water gas for diluting, in the proportion (say) of 25 p.ct., coal gas containing only the unavoidable quantity of incombustibles. But in doing this a very important point is to work regularly—as closely as conditions will allow—to standards in respect of both quality and quantity.

Mr. Glover's reported statement at the Eastern Counties meeting is worth careful reading. We discern in it a likely recommendation to the Coal Controller of a means whereby the gas industry can effect economy in coal and transport, and economy for itself and its consumers. The subject has for some time past been kept prominently to the fore in the "JOURNAL;" and we are now reaching the time when action must succeed argument. The sooner the better. The President of the Institution of Gas Engineers (Mr. A. E. Broadberry) realizes this. At the same meeting, in moving a vote of thanks to the President of the Association (Mr. John Terrace) for his address, he remarked upon the "great need" there would be in the national interest in limiting the quantity of coal used on gas-works, and upon the difference being made up by the addition of a proportion of blue water gas. Interest has, we hear, been aroused throughout the country by the recent articles and correspondence in our pages. The truth is sinking home; and those gas engineers who commence now (as some are doing) to "ration" themselves in respect of coal consumption by a decrease equal to 25 p.ct. of their gas output—utilizing coke as a substitute—may later have very good cause for being thankful that they took the advice tendered to them, and tendered for well-founded and not by any means lightly-conceived reason

Central Organization Revived.

The National Gas Council has not been long in existence before it has buzzing around malcontents, critics, and would-be improvers. The same with the new Government; the same with the several governmental departments brought into existence to deal with home war conditions; the same with every prominent institution—one and all, being prominent, make excellent targets. Well known is the fact that in its constitution, the National Gas Council is not all we hoped it would be—much less is it the fully representative central organization that was originally suggested by us when, some years ago, we drew attention to the insufficiency and disunited character of the organized representation of the component parts of the industry. But, the Council having been brought into existence, though we should like to see its executive body completely representative, we are, at any rate during the war, disposed to lay aside for a time our old contentions, and to pass ultimate judgment upon the Council on the evidence of the results of their labours—labours that, it must be recognized, are being carried on under tremendous and not easily handled difficulties. It should not be forgotten that the work that has fallen to the lot of the Council has, owing to the war, been of an exacting character; and, since its brief existence, it has shown how essential in these heavily weighted days, with their frequently changing conditions, was a head and mobile body, competent to negotiate in the joint name and interests of the various elements comprising the industry. The premature critics really know little of the vastness and variety of the work that has been involved, of the time that has been spent over it, particularly by a comparatively few men who have thought, acted, defended, and pleaded for an entire industry of which their own undertakings form only a part. The bare statement of result does not disclose all that has led up to it. Knowing something of the claims of the work, we feel there is good reason for sympathy rather than complaint—direct or indirect—from those who expect much, but have personally done little to secure it.

Singularly, last week the subject of the National Council and central organization was introduced at two meetings of District Associations—first, in the course of the Presidential Address by Mr. John Terrace to the Eastern Counties' Gas Association, and, secondly, by Mr. T. M. Waller in a paper read at the meeting of the North of England Gas Managers' Association. Neither Mr. Terrace nor Mr. Waller is found among the critics whose discontent began to privately find expression before the Council had even got well settled down to its work. Practically the one and only point made by both was as to the sufficiency of the Council as representative of the gas industry; and both made suggestions which show how between men who have deliberated over the subject views will vary. Both are convinced that the Council is not all that is required, but both—one being an Engineer and the other a Secretary—have views on the question of composition of what should be the head body that are not coterminous, while both have equally at heart the best interests of the industry. Down South we have Mr. Terrace saying that the Council is the first step towards a more complete co-operative movement for helping forward the work of the industry; up North Mr. Waller agrees that it is entirely a step in the right direction, but that it still leaves much to be desired, because it cannot truly be described as representative. So far so good. There is concurrence that, at any rate, we are on the right road in the matter of organization, but that the final goal has not been reached. What should be the goal? The Engineer in the person of Mr. Terrace speaks: "It would seem more "rational to make use of the machinery of the Associations "forming the National Gas Council, with the subsidiary "District Gas Associations and their Commercial Sections, "together with the Junior Associations, rather than try to "devise an entirely new body." Says the Secretary in the person of Mr. Waller: "An important industry such as ours "should have an Association to represent all who are in-"terested in it; and I think it should be open to include in "its membership officials, and foremen of gas undertakings, "manufacturers of gas plant and appliances, and companies "owning coke-oven plants." He wants a National Gas Association—not merely a Council—without interfering with the existing specialized organizations, and a body with a wide constitutional base. This is seen further when he suggests that the new body should be sectionized into five groups: (*a*) Directors and committeemen of gas undertakings; (*b*) Engineers and managers and their assistants; (*c*) Secretaries and their assistants; (*d*) Gas plant and apparatus makers and their assistants; and (*e*) Representatives of allied businesses. He is also of opinion that the Gas Companies' Protection Association might be the nucleus of the new body.

Now supposing Mr. Terrace, the Engineer, had been Mr. Waller, the Secretary, it is just possible that he might have entertained much the same broad views as the latter, seeing that the organizations pre-existing the National Council do not give (except partially through their undertakings in the British Commercial Gas Association) any recognized place to the secretarial element of the industry. Supposing Mr. Waller had been Mr. Terrace, he might have held the same views as to the composition of the chief organization being more restricted than is seen in the North of England paper. Points of view on this question are a matter of individual position. But in these days of co-operation, massed strength, and liberal views, this ought not to be. We are—all should be—for the broadest useful base in any central organization. But we do not think there is any value to be gained by the limits being stretched quite so much as Mr. Waller advocates. In the central organization, there should be equality, and the incorporation in it of brains, positions, and experience that can influence for good the interests of the whole industry. Mr. Terrace's ideas as to the formation of a more complete co-operative movement tend to show that the National Gas Council in its constitution is already fairly representative. We cannot, however, see the necessity for specifically embodying the District Associations or the Commercial Sections, seeing that the District Associations are already affiliated to the Institution of Gas Engineers, the Commercial Sections are part of the affiliated bodies, and, moreover, they have a very large part and influence in the British Commercial Gas Association, and so (through Institution and Commercial Association) in the National Gas Council. The Junior Associations, on the other hand, are in an isolated position so far as the senior organizations are concerned. Therefore, in any central organization, the members could well come in as associate members; and this would bring them into direct contact with work in relation to which later on they will be called upon to take a more distinguished part. Present contact would qualify them for this, just as their own Associations now qualify them better than former isolation did for full membership in the senior organizations.

On the other hand, we agree fully with Mr. Waller that directors and committeemen and all responsible executive officers should be included—not only engineers, but secretaries and chiefs of sales departments; and with all such incorporated, we really cannot see the advisability or necessity of extending the membership to foremen. Nor do we think there is much likelihood of the technical and commercial men of the coking industry joining forces in an organization in which there would be an overwhelming majority of gas men. They have already given expression to their views by forming their own independent organizations. Strictly speaking, save in the technical and commercial questions affecting gas sales in bulk to the gas industry, liquid products, and sulphate of ammonia, their interests are not our interests. Besides, the gas industry is a statutory one, with certain rights, privileges, and obligations; the coking industry is not a statutory one, and is only amenable to the common law the same as ordinary manufacturing concerns. Here, again, we have an indication of the point of view being somewhat governed by the influences of environment and position; for if there is one Association above all others that has thrown its doors wide open to those interested in gas and bye-products affairs, it is the North of England Gas Managers' Association, the members of which, to their credit, have catholic ideas regarding membership, and are not obsessed by the old and baneful exclusiveness of certain other gas organizations. This being so, it is rather strange to find Mr. Waller suggesting the Gas Companies' Protection Association as a suitable nucleus for a large comprehensive organization; for as a conservative and exclusive organization, it has hitherto paralleled, if not out-run, anything that previously existed in the industry. A more unlikely thing happening than this particular suggestion taking form could hardly be conceived. The British Commercial Gas Association has a composite ground work far more suitable to serve as the nucleus of an organization such as Mr. Waller has in view. There is something in his suggestion as to the need of a permanent staff in a national organization to keep

a competent and watchful eye upon all movements that affect the industry, adversely or otherwise. We also—previous advocacy assures this—agree fully with him as to the need for proper headquarters for the industry; but our imagination has certainly never soared quite to the heights that Mr. Waller's has done.

However, during the war there is no possibility of the scheme for a larger and more representative central organization being advanced towards realization; much less is there any chance of the establishment of headquarters suitable for an industry of the dimensions and standing of that devoted to gas supply and the treatment and trading in the secondary products of coal carbonization. At the same time, there is a certain satisfaction to us—having been our concern for so many years—in this revival of these questions, which have an importance that cannot be over-rated. It shows that central organization and a larger co-operation are in gas men's minds; and if individual ideals fall short or exceed what in other quarters is thought to be the desirable aim, what matters? It is by differences of opinion on such subjects that actual necessity is determined, and right plans are laid and materialized.

A Chapter in War History.

THE far-reaching effects of the war upon British-owned gas undertakings operating abroad, are well illustrated by two meetings reported in our news columns to-day. One is that of the Imperial Continental Gas Association, whose properties are now in the main, by the barrier of war, removed from the administration of the Board, and are in the hands of the Central Powers; and the other is that of the Primitiva Gas Company, Ltd., which operates in the City of Buenos Aires, and this very distance from the scene of the war has been a disastrous circumstance, though it is hoped only a temporary one. The two reports are worth reading together, for such a chapter in the history of the gas industry as these two large gas undertakings present has no precedent, and may not be repeated—at all events, we hope not. They form a strange contrast with the times of peace. The hills of difficulty and trouble of peace times used occasionally to appear remarkably great; they sink into insignificance—they appear almost as nothings, though in their day much ado was made about them—when contrasted with the mountains of trouble and difficulty of these times. But the adversities of to-day will have their psychological influence in the future, when ordinary difficulties have again to be encountered. Then these will be regarded in their right proportions, and be dealt with with a lighter heart because of their relative smallness to those that had to be met during the war. In the case of the French works in which the Imperial Continental Gas Association are interested, there have been experiences of the cost of coal being upwards of £4 per ton; and several shillings more than that are now being paid by the Primitiva Company. How is it possible (some of the small French works have had to close-down) to carry on a gas business with coal at such a price as this? Besides, in the Primitiva case, it has been a constant struggle to get coal at all; and last year there was a considerable shortage from actual requirement. What the shortage will be this year, goodness only knows.

But as to the Imperial Continental Gas Association, no definite news is forthcoming from Belgium; and the veil is tightly drawn over the Association's interests in Austria-Hungary. However, the Chairman (Sir Charles J. Jessel, Bart.), on this occasion, had some news for the stockholders, who appeared glad to think that there was some activity pending in connection with their properties, even though it consisted of the lodging of claims in our Foreign Claims Office, and the liquidation by Germany of the Association's very large assets in Berlin. In respect of the properties in Germany, Belgium, and Austria-Hungary, the total claims, at the date at which they were lodged, were £15,713,984, and there will be something to add to this for losses subsequent to that date. There is in regard to the liquidation of the German properties good confidence that there will be fair treatment of the Association; for it would be fatal to the Germans with property in this country if there was any treachery or trickery on the part of their own Government. It is very commonly known that the value of the German interests in this country exceeds that of the British interests in Germany. But the "liquidation," which Sir Charles Jessel urged should not be construed as "confiscation," will terminate the connection of the Association with Berlin which has continued uninterruptedly, and not unhappily until the war, over some ninety years. These are days of quick and considerable changes, and (so crowded are the days with momentous events) the flights of time appear to be, despite the contrary assertions of calendar and clock, speedier than before. But it only seems to be the other day that Sir Charles was congratulating the proprietors of the Association upon new concessions which meant an extension of their existing interests in Germany, and prolongation of the average length of the concessions. And now? The Directors and proprietors are contemplating the appearance of the word "Finis" to their relations with that country, or at any rate with Berlin.

The Primitiva Company have nothing of the same veiled and complicated character to face. Their troubles are all exposed to their view; and they are anything but pleasant to look upon. They are due primarily to coal, to financial difficulties with the Municipality, to the attitude of the ex-Mayor of the city, to German influence not unassociated with the electricity supply of the city, and to the refusal to allow the Company to raise their contract price for gas. The story is one of the greatest scandals on record of gross treatment by a great Municipality of a Company struggling with adversity of purely external origin. But with the new Mayor in office, these matters are likely to adjust themselves, and for the credit of the city not before time. If, fortunately, this is the case, the coal and freight difficulties will be—as they are in fact now—the outstanding trouble, the nature of which trouble can best be gathered from the address of the Chairman (Mr. A. E. Bowen) at the shareholders' meeting. The statement in this connection has a twofold interest for all gas engineers at home. Their own difficulties pale in comparison with the intensity of those that have had to be encountered by the Engineer and General Manager (Mr. W. Angus); and there is the technical interest surrounding the account of his attempts to find substitutes for coal to be used in the production of gas. It has been a constant struggle to maintain the gas supply, which is the important thing. At whatever present inconvenience and sacrifice, this must be done; the future of the Company largely depends upon it. Wearing and tearing as such conditions are upon men responsible at the seat of operations, they contribute to the tale of the grit and of the resource of those who, as chief officers, manage the affairs of the gas industry abroad. Many of these men are British born and British trained, and have British capital confided to their safe-keeping.

Priority for Gas-Works Plant.

This is at the present time a somewhat irritating question. Engineers in one industry or works who want new plant or extensions of old have a feeling that some other industry or some other works manage to get preferential consideration in the matter of priority, and that therefore the machinery dealing with priority does not operate with the exactness that it should do, and with an inclination of its output the greater as the importance of the work that is being done for the nation and the war becomes heavier. Various gas engineers gave voice to a grievance in this connection at the meeting of the Eastern Counties Association on Thursday. We sympathize with them. They are being robbed of economies and put to inconvenience because certain work cannot be carried out. This is the more acutely felt in these times of financial and manual outgoings than would otherwise be the case. Mr. W. W. Townsend wishes the National Gas Council to make representations on the subject to the Ministry of Munitions; and he suggests that a Committee of gas experts should be appointed to assist the Priority Committee by sifting out currently necessary from currently unnecessary work in connection with applications. Cases of hardship were cited by Mr. Townsend and Mr. E. W. Smith. But we must not lay too much stress on the fact that the gas industry happens to be one that supplies so much of the essentials for explosives making and other things for war purposes. It is its fortunate case that it is so; and the fact is quietly doing the industry much material good. As Mr. J. H. Troughton truly says, we must not look too much for a *quid pro quo*. The principal duty of the Ministry of Munitions is to see that works and factories are maintained in a condition that war supplies are not interfered it; while the very existence of the Priority Committee means that opposing perverse conditions exist that call for negotiation and judicial work. Were these conditions more

favourable, their work would be lighter. They have to look at the question from the point of view of war supplies and requirements; while some gas engineers take their stand entirely on benzol and toluol. Mr. Smith truly remarks, "What is the good of warships without guns, guns without shells, and shells without high explosives?" The Ministry of Munitions reverses the question: "What is the good of high explosives without shells, and the shells without guns?" This puts a different complexion on the matter. At the same time, there are cases in which it seems the Priority Committee have given preferential treatment; and these cause dissatisfaction. But perhaps if all the circumstances were known, the traces of actual preference would wholly vanish.

Board of Trade and the Sliding-Scale.

It would be folly, on the first time of asking, to accept as final and conclusive any inclination of the Board of Trade not to move in the matter of assisting sliding-scale gas companies whose proprietors are suffering considerable losses through the war. In our "Correspondence" columns, Mr. Samuel Tagg, of Preston, for reasons which he advances, suggests that it is possible that collective pressing may induce the Board to take action. But we rather think he is somewhat in error in his assumption that the "majority" of sliding-scale companies are "certified" under the Munitions of War (Amendment) Act, 1916. Our editorial article last week on the subject of the Schedule of Protected Undertakings gave the information that not more than 100 gas undertakings had been so certified. However, Mr. Tagg proceeds to show in his letter that the Board of Trade could render the necessary assistance to sliding-scale companies by the issue of an Order in Council under the Defence of the Realm Act.

Coke-Oven Gas for Lighting Purposes.

There is a Board of Fuel Research in existence whose work is being directed to the making of the best possible use of our coal supplies, with the view of realizing greater economy and value. There is a Coal Controller anxiously devoting time to the devising of ways and means for making adequate provision for the fuel requirements of the country. There is a Committee of the House of Commons, presided over by Mr. Mooney, who last week decided that, in giving the Sheffield Gas Company coke-oven gas purchase powers, the proviso was to be attached that the gas was not to be used for lighting. Parliament provides the money for investigation into economy; and a Parliamentary Committee puts a proviso to a scheme designed to prevent waste which would cripple it were it any other place than the industrial City of Sheffield. This illustrates the folly of men adjudicating upon something which they do not in the least understand. It would be of considerable interest to gas men to know the reasons for the decision. Coke-oven gas is made from coal the same as the gas distributed from gas-works; the only difference is that the coal is carbonized in large bulk and not in comparatively small quantities. The gas is the same in its chemical composition. If distributed for general purposes (including lighting), it would be subjected to the same tests for calorific power and impurities as the gas made at the gas-works. The ridiculous prohibition of the use of the gas for lighting purposes completely precludes, through the single system of pipes and meters, its distribution for heating purposes in dwelling-houses, and confines its use to industrial heating and power. What is the good of talking of fuel economy and so forth, if a Committee of the House of Commons is permitted to impose unnecessary restrictions of this kind? Middlesbrough and Leeds are both utilizing coke-oven gas for all purposes to which town gas is ordinarily applied. And why should not Sheffield if the coke-oven gas is up to standard quality?

Oil-Washing and Debenzolizing.

The paper that Mr. A. Edwards recently read before the Yorkshire Junior Gas Association, and which was published in last week's issue, contained some interesting and useful information from his research on oil-washing and debenzolizing. As Mr. Edwards states, there is a dividing-line representing the most economical working at some point in the range of oil used, below which economy in steam is more than balanced by the loss of benzol, and above which increasing recovery of benzol is more than balanced by the increasing steam and water cooling demanded. This is so. But there is another matter which is not mentioned by Mr. Edwards. It is this, Is it possible to obtain his "economical working point" as far as recovery is concerned, having regard to the calorific value of the gas? With respect to the temperature of the wash-oil, Mr. Edwards's experiments show very clearly the marked effect this has on the benzene concentration; and certainly the makers of benzol recovery plants should make sure that the debenzolized-oil cooler is efficient for summer temperatures. In cases where the trouble in cooling the benzol is very acute, it would be beneficial to use green oil in place of creosote, owing to its higher efficiency; therefore, less oil can be used to obtain the same results. This was a point made by Mr. W. G. Adam, B.A., of Beckton, in the article contributed to the "Journal" for Feb. 20 (p. 343). The steam-meter is certainly a desirable adjunct; but a very fair idea as to the quantity of steam needed on the spray may be judged by the amount of condensed water in proportion to benzol; the sample being collected in a measuring cylinder as it runs into the separator. The required amount of water can be found by an analysis of the debenzolized oil. It is observed that Mr. Edwards advises, in dealing with periodic retort tests of crude benzol, that they should be carried out in a retort with the thermometer bulb in the liquid. There seems, however, to be a big difference of opinion as to whether the bulb of the thermometer should be in the liquid or the vapour. It would be helpful if a standard method of testing crude benzol could be decided upon. The curves constructed by Mr. Edwards for a quick and approximate analysis of the crude benzol are ingenious; and when a standard method of testing crude benzol is under consideration, they should not be forgotten.

The Deputation Question.

In times gone by—when the present war had not come along to throw all ordinary matters out of gear—the objections to local authority deputations which used periodically to be heard in different parts of the country (very often repeatedly emanating from the same council chamber) seemed rather trivial. Now, of course, there is more to be urged on behalf of the objectors. But then, on the other hand, there must be far fewer deputations arranged. For one thing, money is wanting to spend on new works; and even if money were available, there would remain the difficulty of obtaining labour and material. There was, however, one deputation made up; and in a recent issue, a local paper had much fault to find with it. The Stockton Corporation, it seems, fixed up a trip into the Midlands by three aldermen and four councillors, to view tar-distilling plants established in various towns, with the object of seeing whether it is desirable to establish one at their own works. The first reasons stated for the protest are that "money is dear, time is valuable, labour is scarce, and railway travelling is both expensive and strongly deprecated." This is all true, as well as the further argument that the Gas Engineer (Mr. Matt. Dunn), on whose recommendation the idea of procuring the plant is entertained, possesses the requisite knowledge to make the details of the apparatus clear to the members. Whether after all the deputation did carry out their programme, we do not know; but when all the facts are taken into consideration, the attitude assumed by the local paper seems understandable.

Commercial Intelligence.

The subject of British trade after the war is one that provides scope for the greatest energies; and there is no doubt the Advisory Committee to the Board of Trade on Commercial Intelligence have a lot of work before them. The Committee, however, is a strong one, and so may fairly be relied upon to prove equal to any demands that may be forthcoming. There are many well-known names among the members, and two specially familiar to readers of the "Journal"—Sir Henry Birchenough (who is a Director of the Imperial Continental Gas Association, Continental Union Gas Company, and Danish Gas Company) and Sir Hallewell Rogers (the Chairman of the Birmingham Corporation Gas Department). The Committee have already considered and approved proposals for the co-operation of the Board of Trade with associations of manufacturers for the investigation of overseas markets. Arrangements are being made by the Department of Commercial Intelligence for the extension of the official representation of the United Kingdom trade throughout the British Empire; and the Com-

mittee have approved of other arrangements formulated by the Board of Trade and Foreign Office for special trade inquiries in Spain and Portugal, and proposals for the collection of samples of foreign goods which compete with British articles in important foreign markets. Evidence of appreciation of coming opportunities by business people in this country is to be found in the statement that over 700 firms have applied for interviews with H.M. Trade Commissioner for Canada, who is at the present time in the United Kingdom on an official visit.

OBITUARY.

W. D. CHILD.

Unhappily, Mr. W. D. Child has not lived very long in his well-earned retirement after nearly forty years' service as Engineer and Manager to the Romford Gas Company; for he died last Sunday week, after a long and painful illness, and was buried on Thursday in Romford Cemetery. As a matter of fact, his retirement in the latter half of 1915 from the active business life which he had led was caused primarily through ill-health.

With so long a record of service there to his credit, Romford, of course, represented by far the larger part of Mr. Child's career; but he had much other valuable experience to aid him. On leaving school, he was articled to his father, head of the firm of Messrs. J. E. Child & Son, who for many years had been established as engineers and contractors at Southwold, giving special attention to gas-works plant. At a later period, he enlarged his experience of the design and manufacture of gas apparatus, first at Newport (Mon.) and then in London. At one time in early life he went out to Australia; but not finding there occupation of the kind which he desired, he returned in due course to the Old Country. It was in 1876 that he was appointed Engineer and Manager at Romford, when the make per annum was no more than 15 million cubic feet, and the price 5s. 5d. per 1000 c.ft. He saw the output grow to more than ten times this amount, and the price nearly halved. In these circumstances, it naturally fell to his lot to carry out many extensions; and in 1892 new works were started which had been designed throughout by him. On his retirement, he was granted an allowance, and elected to a seat at the Board of the Company. A feature of his connection with the undertaking was the good-will which subsisted between him and those who worked under him. This was manifested on his completion of thirty years' service, in 1906, when he was presented with a gold watch, subscribed for by the whole of the staff and employees. An instance of his keenness, too, in looking after the interests of the Company is to be found in the lengthy controversy which took place some five years ago [and was recorded in the "JOURNAL" at the time] between him and the Guardians of the Romford Union, on the subject of the adoption of petrol air gas lighting for the workhouse.

Mr. Child was elected a member of the British Association of Gas Managers [as the Institution of Gas Engineers then was] in 1874; and for many years he was a member of the Southern District and Eastern Counties Associations, of both of which he occupied the Presidential Chair. He read a paper in 1876 before the British Association of Gas Managers, on the "Valuation of Ammoniacal Liquor;" and between that time and the presentation of his last paper, which was to the Southern District Association, in March of last year, on the "Construction of Concrete Purifiers at Romford in 1913," he took quite an active part in association work. In Masonry, he was well known; having been W.M. of the Liberty of Havering Lodge in 1894, and of the Evening Star Lodge in 1901. Of the latter Lodge, he for some years occupied the post of Secretary. In 1915, he was appointed by the United Grand Lodge of England one of the Committee of Management of the Royal Masonic Benevolent Institution.

The death is announced of M. LEON FOUCART, a member since 1876 of the Société Technique du Gaz en France, and Director, in succession to his father, M. Ch. Foucart, of several associated gas-works.

The death occurred, on the 1st inst., at Ilkley, of Mr. THOMAS D. OVERING, who was for a number of years Manager of the Birstall District Council Gas-Works. He left Birstall to take charge of the gas-works at Para. When he returned to this country, he again took up residence at Birstall, but subsequently removed to Ilkley. Birstall, however, remained the centre of his interest. He was 57 years of age, and leaves a widow. At the funeral, representatives of the Birstall gas undertaking attended.

Mr. JOHN COWARD, J.P., whose death occurred recently, at Harrogate, in his 85th year, was Chairman of the City of Durham Gas Company, the Bishop Auckland and District Gas Company, and the Spennymoor Gas Company. On the occasion of the 80th anniversary of his birthday, he was the recipient in the case of all three undertakings, of handsome marks of the esteem in which he was held by fellow Directors and the officials. At one time he was Chairman of the Durham Mining Federation Board.

Sir WILLIAM S. BROWN, an ex-Lord Provost of the City of Edinburgh, and Chairman of the Edinburgh and Leith Gas Commissioners from 1909 to 1912, died suddenly a few weeks ago. He was in his 73rd year, and, since his retirement from the Civic Chair, had been in enfeebled health. He entered the Town Council in 1885, and in 1903 was elected to the treasurership of the city. On taking up the chairmanship of the Gas Commissioners, he brought his customary energy and judgment to bear upon his new duties. It was in his time that the Commissioners began their "forward policy," which has given such excellent results.

PERSONAL.

Mr. G. DOUGILL, Assistant Manager at the Leeds Corporation Gas-Works, has received an appointment under the Ministry of Munitions.

Mr. EDWARD J. FOTTRELL has relinquished the appointment he recently held as District Superintendent of the Wandsworth, Wimbledon, and Epsom District Gas Company, upon receiving a Commission in the Royal Engineers.

At the last meeting of the Oldham Gas Committee [reported on page 252 of this issue], reference was made to the resignation of Mr. ARTHUR ANDREW, on the ground of ill-health, of his position as General Manager of the Gas and Water-Works Departments.

The Town Clerk of Dublin has intimated to the Corporation that Alderman W. F. COTTON, M.P., D.L. (ex-Chairman of the Alliance and Dublin Consumers' Gas Company), has become disqualified owing to absence for over six months. The Alderman's state of health has greatly interfered with his public activities.

The recommendation of the Glasgow Corporation Gas Committee, that Mr. RALPH HALKETT, the Commercial Superintendent, should be appointed Assistant General Manager, with a salary commencing at £700 per annum, was approved, after a brief discussion, by 43 votes to 18. Bailie Drummond, in support of the proposal, said it had been felt for many years that an assistant to Mr. Alexander Wilson (the General Manager) was desirable. More than one man should have a full knowledge of the details of the department. Mr. Walker moved that no appointment be made during the continuance of the war.

Previous to leaving on the 1st inst. to take up his new appointment as Secretary to the Bristol Gas Company, Mr. S. E. HALLIWELL was presented with an easy chair by the employees of the Littleborough Gas Company (of which he had been Manager and Secretary since 1901). Mr. H. Ashton presided; and the presentation was made by Mr. F. Cheetham, the oldest employee. Mr. J. C. Hudson (Chairman of the Board) and several Directors were present. The employees testified to the good feeling which had always existed between Mr. Halliwell and the workmen; and the Directors spoke of the excellent services he had rendered. All cordially wished him success in his new position. Subsequently, Mr. Hudson, on behalf of the Board, made a presentation to Mr. Halliwell.

Gas for Drying Clothing.

Gas is successfully being used for the purpose of evaporating gasolene from clothing after the garments have been dry cleaned; and an illustrated description of an apparatus installed for the purpose appears in a recent issue of the "Gas Record" [Chicago]. The cleaning process is one which involves the washing of the clothing in gasolene, after which it is wrung out and dried, just as if it had been washed with water. It was to overcome the disadvantages attendant upon hanging the clothing out of doors that first electricity (which proved too slow), and then gas, was tried. The installation was put in by the Pocatello (Idaho) Gas and Power Company, and consists of a drying chamber, with a gas-heater outside, but also covered in. Above the heater, and within the space that is covered in, a hole 4 in. by 8 in. is cut in the side of the drying chamber; and from this a galvanized iron pipe of like size is run to within about 6 in. of the top of the interior of the chamber—thus carrying all the hot air to the top of the chamber, and above the clothing, which is suspended from a rack. At the other side of the chamber, and on a level with the bottom of it, is a 6-in. circular opening to the atmosphere. About a foot from this opening is placed an electric fan of the induction type. Mr. W. E. White (the Company's Manager) explains that the clothing is so arranged as to form, as it were, baffles, thereby causing the air as it is drawn out to pass between the hanging garments and stimulate the action of evaporation. The gasolene vapours, being heavier than air, fall to the bottom, and are removed by the fan from the building. Over the heater itself there is a hood, which is hinged to facilitate inspection; but this hood must be down when the heater is burning while the chamber is being filled with clothing. Thus gasolene cannot come in contact with the open flame.

It was announced at the annual meeting of the Iron and Steel Institute that among the awards made by the Council from the Carnegie Research Scholarship Fund, was one of £50 to Mr. W. C. Hancock, to enable him to continue his investigations on refractory materials, with special reference to the manufacture of coke-oven bricks.

ELECTRICITY SUPPLY MEMORANDA.

The two great topics in the electricity supply industry to-day are reformation or reorganization and fuel economy—all the ordinary polemical subjects for the time being are but side-issues. It is right that in reformation, reorganization, or whatever other description is applied, the beginning should be really fundamental, because all else depends upon it. The technical men are considering how economy can be brought into existence at the electricity generating end; and concentration of generating power and the pre-gasification of the fuel for the recovery of bye-products are the ways that are prime favourites. But in nearly all the open discussions a respectful distance is maintained from any suggestion that there could be such a thing as a "linking-up" with the gas industry, through the most direct means of employing coke for steam-raising, so promoting national fuel economy, and saving huge additional expenditure on carbonizing and residual products plants which the materializing of the ideals of electricians would necessitate. Just as electricians are looking at the question of generation fundamentally from their own industrial standpoint, so they should consider it fundamentally from the point of view of the working and raising of coal, and the effect on the secondary products markets of producing extra supplies, or supplies in excess of what are necessary. It is not a partial economy that is required nationally, but an economy right away from the very *alpha* of the fuel question, the location of which is in the coal-pits. They are also considering the question of cheap overhead transmission at high voltages, and the conjoint one of wayleaves. Beyond it all is the economy which, like many other abstractions in which some electrical minds indulge, is going to work marvellous things in industry and in the home.

Aerial Flights to Reformation.

Meantime, in connection with several electricity stations, national fuel economy is being served by the use of gas-works coke. Quietly, there is a linking-up going on in this direction, which may have important results in respect of future developments; for the electricity industry cannot *per saltum* synthetize its separate units. That is a process for time; and developments should be considered in the light of their relation the one to the other, and not the old mistake be made of adopting a definite line of action only for it to be afterwards found that another line would, with less expense, have given an equally good economic result. In this connection, we notice a vague paragraph in an electrical contemporary, which announces that the Electricity Committee of the Marylebone Borough Council has received a communication from Sir Arthur Duckham, the Chairman of the Advisory Committee of the Ministry of Munitions, requesting the General Manager of the department—our old friend Mr. A. H. Seabrook—to advise him on matters associated with a proposed scheme and experiments for the economical use of coal. We are not aware what "scheme" this refers to; but the whole gas industry knows that one of its eminent students of, and practitioners in, the carbonization of coal for the production of gas and coke is Sir Arthur Duckham. Perhaps there is some connection between this vague intimation of a desire for consultation and advice and another announcement of the Marylebone Electricity Committee. Mr. Seabrook for long had his eyes on a second string to his fuel bow; and some time ago the information transpired that certain of his steam-raising units were being fitted so as to admit of the use of coke as fuel. Now the Electricity Committee states that its attention has been drawn by representatives of the Government to the necessity of economizing in coal consumption, and, where possible, burning coke and coke breeze, and thereby enabling some of the bye-products of coal to be extracted. The Committee favours two additional boilers being fitted with apparatus to allow of the consumption of coke. We know that at the present time there is quite a big business being done in equipping boiler plant for the utilization of coke.

Gas Coke in Electricity Stations.

However, about the larger schemes of reformation, the Committee appointed to make inquiry and advise the Board of Trade are already beginning to receive gratuitous advice from various quarters. A "Power Supply Engineer" in an article in the "Electrician" submits "some points" for the consideration of the Committee; and, in one part of the article, he wisely suggests that whatever is done should be of a "flexible character," so that promising co-operation offering from any direction may not be shut out, though he has large visions as to electrical potentiality compared with other sources of light, heat, and power. Even ultimately, he says, it is unlikely that electricity supply will deal with more than one-half of the coal consumed in the country. The generous anticipation conveyed by the words is pardonable in an electrical engineer. Perhaps the gas supply and coking industries will between them deal with the other half. At any rate, we may encourage the hope that this will be so. But as it is unlikely that the electricity industry will ultimately deal with more than one-half of the coal used, the "Power Supply Engineer" prudently suggests that the problem of fuel economy is not one solely for electricity supply to decide; and there must be a large measure of co-operation between that industry, colliery and gas undertakings, steel and iron works, and all the large coal-using industries of the country. It is a satisfaction to gather from these words that in a "Power Supply Engineer" we have not one of those electrical imbeciles (there is no other description for them) who used to dream of the electricity industry snuffing-out the gas industry. It must to-day be a consolation to those weak-brained individuals that the very industry which they had visions of assisting in wiping-off the face of the earth is in existence and dealing with coal in a manner that has put an effectual barrier between them and the aspirations of the brutal desperadoes who sink hospital ships and bombard undefended coast towns.

Co-operation in Development.

However, among the suggestions of the electrical writer is one that the State should financially assist the electricity industry in the early years of its regeneration; and, if this is so decided, he sees sufficient justification for taxing all users of raw fuel, and employing the revenue so obtained to develop economical processes. For example, "if a tax of 1d. per ton were imposed on all raw coal, with a rebate to those users who extract the tar and the ammonia, a revenue of (say) £1,000,000 per annum would be produced. If this tax were increased annually by 1d. per ton until it reached 1s., we should in twelve years have obtained (say) £30,000,000 for development work, and so should have imposed a strong inducement to economy." The figures are somewhat out of truth; for last year, after deducting exports, the amount of coal available for home consumption was 213,833,000 tons, including the coal for use by the Admiralty, or as bunker coal in merchant ships (12,988,000 tons alone were shipped for steamers engaged in the foreign trade). The amount used by the Admiralty at the present time is an unknown quantity. Anyway, about 18 million tons of coal per annum are carbonized by the statutory and non-statutory gas undertakings, and the coking industry deals, in bye-product coking ovens, with about 13½ million tons, out of the 20 millions or so it uses. Thus there is a deduction of 31½ million tons to be made from the amount calculated as taxable. But if a tax be good after the electricity industry has mended its ways, and has given up the use of raw fuel, why should it not be good at once—before it does so. It was Mr. J. B. Braithwaite, the Chairman of the City of London Electric Light Company, Ltd. [who, by the way, has not replied to the criticism in the "Memoranda" of April 10 of certain remarks of his], who stated recently that the electricity supply stations consume about 4 million tons of coal a year. Then why should not the Government adopt "Power Supply Engineer's" suggestion immediately, and collect 1d. per ton next year from those stations, and increase the tax by 1d. per ton each year until they utilize a fuel that has been treated for the recovery of its various useful constituents? The Government would "have imposed a strong inducement to economy."

A Tax on the Use of Raw Coal.

The writer of the article suggests that the Committee appointed by the Board of Trade to inquire into cheaper electricity supply for power have not any simple problem before them. He regrets the muddled manner in which the electricity supply industry has been developed in the past. The "Electrician" itself is touched by the reminder. "If only we could make a fresh start," it says, "things would be much easier. . . . Undoubtedly greater foresight might have been shown in the past, so that a less tangled state of affairs would have been the result; but in any case, it is impossible to map-out completely the development of a growing industry, the importance of which was by no means realized in the early days." But if a fresh start was going to be made from to-day without the accrued experience, it is just possible the electricity industry would pass through a similar labyrinth of error. "Power Supply Engineer" starts from the point that the whole problem of cheap power is inextricably bound up with the economical treatment of coal, and the recovery of such products as tar and ammonia. He does not go far enough. "Tar and ammonia" constitute a loose description of what can be done. He sees in the future large generating stations, with a wide scheme of transmission to the distributing centres. A considerable and immediate expenditure of capital is required; but, alas! the electricity supply industry has laid out some £75,000,000, of which approximately one-half is in generating plant. To write this off rapidly, the double burden would not be a light one; but he has confidence in the quick expansion of load, which would partially relieve the financial stress. Such writers always light-heartedly proceed with their predictions as though altogether infallible. The financial stress does not mean cheap energy, especially with plant costing 50 p.ct. in excess of pre-war rates, and likely for many years to be heavily priced. This brings him to his cardinal suggestion. State control is in his mind—meaning by this not only regulation, but special assistance. An operating organization would be necessary. This would deal with generation and main transmission, leaving in existence the present distributing authorities. The organization might be a joint concern in which the distributing authorities invested in proportion to their demands, and from which they shared the benefits proportionately; or it might be an operating company relying on public subscriptions for share capital, and on the State and existing distributing authorities for loan capital. That is the scheme; but we venture to say the Board of Trade

An Ambitious Scheme.

Committee will start from the existing conditions with a far less ambitious proposal, whatever may be the distant goal.

Overhead Transmission.

In connection with large concentrations of electrical plant, the question of overhead transmission is now being discussed—notably through a paper by Mr. G. V. Twiss before the Institution of Electrical Engineers. He thinks it quite possible we may in this country have transmission lines working at 100 kilovolts. The linking-up of power stations may necessitate much higher voltages than are used at present; and there is the possibility of developments such as the transmission of power in bulk at high voltages from coal areas. The arrangement of the conductors involves taking into account considerations electrical and mechanical—the latter the possibility of the wires swinging together, the leverage on the cross arms and poles, and the effect of snow in unevenly weighing-down the conductors or in falling off and causing the wires to foul one another, or else coming too close together. The author favours the triangular arrangement, with the base of the triangle slightly tilted, as giving the shortest poles, and the shortest cross arms, compatible with the absence of swinging together and snow effects. He points out that in this country span lengths are found of the order of 150 ft., with a maximum perhaps of 300 ft.; while abroad the usual length is 500 ft., and in America and Canada as high as 700 ft. The designer, the author says, can get equal safety with any length of span, and economy should be the only consideration. Spans of 150 ft., in his view, appear never to be justified on economic grounds, even with the low tensions of stringing employed in this country. From the factors presented, it appears that the larger the conductor, the longer the economical span; the higher the tension of stringing, the longer is the economical span, and the less the cost of the line; and the greater the number of conductors, the shorter is the economical span length. Under the Board of Trade requirements, the cost of supports for spans of 150 ft. is shown to exceed that for the economical span by as much as £100 per mile. Overhead transmission at high voltages claim great engineering care, and not by any means a light capital expenditure, though lighter than underground cable work.

Way Leaves.

Overhead transmission is a companion subject to that of the construction of the super-power stations; and with it is bound-up that of wayleaves. Electrical people think they are particulariy hard done by in this matter; that for the economy of electrical distribution there ought to be no power of prohibition of overhead transmission; and that in respect of wayleaves a small rent should satisfy the private property owner. In other words, the feeling of electricians is that the electricity supply industry should always ride supreme over private interests if electrical interests are in any wise adversely affected. At the request of a Committee appointed by the Council of the Institution of Electrical Engineers, Mr. C. Vernier recently read a paper before that body; and the paper and discussion formed one continuous chain of complaint at the attitude of landowners, and of a desire for legislative reform—of course, in the electrical way. In the paper it was pointed out that on 20,000 volt mains something like 50 p.ct. can be saved in cost by the use of overhead wires, instead of underground cables. By using cross-country routes for underground mains, instead of keeping to public roads, a saving of 30 p.ct. is not uncommon. The Board of Trade are willing to allow extra high-pressure overhead lines on public roads, subject to compliance with strict requirements for public safety; but practical considerations usually render them, if not quite impracticable, at least extremely undesirable. There is the probability, too, that in the near future much higher transmission pressures will be employed; but these in the present state of the Act cannot, it is said, be dealt with satisfactorily, if at all, by underground cables. The Electric Lighting Acts compel statutory companies to obtain the consent of the local authority to the erection of overhead mains everywhere outside their own premises. Mr. Vernier is of opinion that appeal to the Board of Trade should be allowed in all cases, and that, while the local authority should have the right to be heard, it should have no absolute veto. It is also pointed out by the author that electricity supply, undertakings like gas and in some cases water, are precluded by law from laying their mains in private lands without special consent, which is possible only by a complete agreement for an easement or wayleave with the owner and occupier. He suggests that the adoption of the recommendations of the Land Inquiry Committee appointed by Mr. Lloyd George in 1912 would go far to overcome satisfactorily most of the present difficulties in connection with obtaining wayleaves, though they had one serious defect, in that no definite period of time was appointed during which consents must either be given or an order be made by the Government Department concerned. Electricians hope, in view of the prospective developments in electricity generation and distribution, that this matter will receive the earnest attention of the new Board of Trade Committee. It is also stated that the subject has been taken up in a Bill framed by the Association of Power Companies in collaboration with the municipal engineers.

In this year's exhibition at the Royal Academy, Mr. B. A. Lewis, the Manager and Secretary of the Carmarthen Gas Company, has a painting in oils of Carmarthen Quay.

LUNGE ON COAL TAR.

LAST week, commencing a review of this classical work (now in its fifth edition) some critical objections of a general character were advanced against the way in which the whole subject has been treated by Dr. Lunge and his publishers. To-day, we proceed to deal in detail with

THE COAL-TAR SECTION.

Two of the three volumes, and a corresponding proportion of the "Addenda" in the third volume, are devoted to coal tar; and it is to this portion of the work that we propose to refer further at the moment—leaving the section on ammonia for notice in a subsequent issue of the "JOURNAL." Having regard to the extensive alterations and additions which have been introduced in this edition, we think it will be useful to indicate its contents, much as we should in the case of a totally new work of the same scope and importance.

The first chapter is relatively short. It treats of coal and its destructive distillation, and gives some historical notes of coal tar and its products, with observations on market prices, supply, and output. The estimates given of the production of coal tar in various countries are of very unequal merit and are frequently obviously based on faulty data or insufficient knowledge, especially in regard to the United Kingdom. The estimates, moreover, do not appear to come down to any year later than 1910, though the author must have access to data for later years. The figures quoted for the United Kingdom for 1910 are: "Gas tar," 830,000 tons; coke-oven tar, 350,000 tons; blast-furnace tar, 200,000 tons. It is not clear whether "gas-tar" includes both the coal tar and the oil tar (or carburetted water-gas tar) produced on gas-works; but by way of comparison, it is interesting to set against Prof. Lunge's figures the following estimate of the production of tar in the United Kingdom in 1910, which Mr. W. J. A. Butterfield gave in 1913 in a paper in which he discussed the question of the quantities of tars available for use on the roads. Tar produced, in tons: Gas-works coal tar, 860,000; coke-oven tar, 460,000; blast-furnace tar, 180,000; producer tar, 15,000; oil tar, 43,000. The greatest difference in the two estimates is in the production of coke-ovens, in regard to which it is, of course, impossible to get as reliable data as for gas-works.

The recovery of benzol from coke-oven gases has, of course, completely changed the former position of coal tar as the chief source of this product. In his second chapter, Prof. Lunge deals with processes for obtaining coal tar, and incidentally with the extraction of benzol from coal gas. Various estimates are quoted for the ratio of benzol extractable from the gas to the benzol obtainable from the tar—some referring to retort-made and others to oven-made gas. The ratio is, as many gas managers know from first-hand experience, by no means a fixed one; but it is probable that authorities who have stated that on the average the vapours in coal gas yield about eighteen times as much benzol as the tar produced at the same time, are not far from the truth. If we remember, in conjunction with this figure, the enormous development of coke production, with recovery of benzol, in Germany in recent years, we can realize how small comparatively the English production of benzol from tar had become. Just prior to the war, it is probable that Germany was producing fully eight times as much benzol as the United Kingdom, and exporting two or three times as much as our total productiom. The position may to a large extent be altered when the war comes to an end, in favour of this country, if the extraction of benzol from gas is continued on all the larger gas-works. This would doubtless be assured if the large oil-producing combines were precluded from selling imported motor spirit at dump prices in order to crush out the new British industry of benzol recovery on gas-works. One lesson the war has taught is the folly, from the standpoint of national safety, of allowing home production to be suppressed through the toleration of unlimited and unnaturally cheap imports.

The second chapter also contains a few pages about blast-furnace tar and carburetted water gas tar, and an effort appears to have been made to give some more recent and trustworthy analyses and information thereon than were to be found in previous editions of this work. It cannot, however, be said that this part of the book is even now satisfactory, for antiquated and misleading information is retained, and many modern analyses to be found in the "JOURNAL" and its contemporaries in recent years have been ignored. Moreover Prof. Lunge would most certainly have had little difficulty in collecting for publication from English and American technical men versed in the production and examination of these two distinctive classes of tar, full particulars of their present composition, characteristics, and uses. As a technical chemist of cosmopolitan renown, he is able to command aid in the compilation of his treatises which would be denied to unknown or little-known authors. Unfortunately, he has not, even yet, availed himself of these advantages of his high standing, in order to collect the best available information on branches of technology which naturally do not come directly within his ken. For instance, no analyses are given of the tar which is now being obtained in considerable quantities from Mond and other modern bituminous coal gas-producer plants. Although variable in its character, this tar is distinctive; and the analyses quoted of the tar obtained from Sutherland producers

over thirty years ago are now valueless as a guide to the character of later producer tars.

In Chapter III., which deals at length with the "Properties of Coal Tar and its Constituents," we are glad to see that many much-needed corrections have been introduced since the last edition appeared. One point referred to, both on the opening and closing pages of the chapter, is, we think, not well stated. It is said that coal tar, like some of its constituents, has poisonous properties; and from the sequel it is evident that the reference is to external and not internal application of tar to human beings. Now the researches of Dr. Ross and others have shown that coal tar as such is practically innocuous, as gas-works and tar-works' employees already knew from experience. The skin-trouble, which ultimately in some subjects may develop into malignant cancer, appears to be confined to workers with pitch and anthacene oil; and Mrs. Norris has demonstrated to which groups of constituents of these products the excitant of the disease is generally to be traced. Nevertheless, this research work—an account of which has been published in various journals and monographs—is not referred to by Prof. Lunge, who, instead, makes a few perfunctory remarks which would leave the impression, in persons otherwise uninformed, that coal tar itself was very apt to cause skin disease.

There is an imposing, but necessarily incomplete, list of compounds found, or reasonably presumed to exist, in coal tar; but in the absence of any quantitative relationship, it is, in our opinion, of little service, especially as it is extremely dubious if all these compounds could be detected at all in any single specimen of coal tar. A list of practical value would state the compounds which predominate in tar made in certain specified conditions of temperature, &c., and thereby indicate how the composition of the tar varies with the physical conditions governing its production. The pyrogenesis of tars—whether the raw material be coal, oil, wood, or what not—is a subject which one would expect to find dealt with in an authoritative manner in a text-book of this calibre. But, singularly enough, it is scarcely touched upon; and then only by way of spasmodic quotations from authors whose work there is no attempt to co-ordinate. It is regrettable that one who has filled for many years one of the most renowned chairs of technical chemistry in the world has (in this book, at least) failed in the first function of a professor—viz., the sifting, co-ordination, and summarizing of the evidence and results brought forward in numerous communications of varying merit. His readers—who here represent the students of the lecture room—expect to have presented to them a digest by a master hand of the immense volume of observations and research work which is accessible to the cognoscenti. They, as student-users of the book, seek from their author-instructor discriminating guidance in the maze; but Prof. Lunge appears to us to have left to them the task of discriminating between the useful and the worthless of the collection of analyses, schemes, methods, and processes which he has made. Obviously it is a task which he is better able to perform than the majority of his readers, and, moreover, is a task which it was his duty, as author of a work of this type, to essay to fulfil.

Later in the chapter the chief properties of most of the compounds which figure in the list just mentioned are stated. The information collected in this section of the book is useful, and should save reference to text-books and dictionaries of organic chemistry. In places there are statements that need revision—*e.g.*, that pentane and the higher members of the paraffin series of hydrocarbons are miscible with alcohol in all proportions. If this statement were true, one of the technical difficulties in the preparation of effective petrol substitutes would be non-existent. The occurrence of water and ammonia in tar is obviously due naturally to admixture of ammoniacal liquor; but there is one point of considerable interest to which we think that Prof. Lunge does not refer—viz., that if (say) 2 p.ct. of ammoniacal liquor of known strength is mixed with a completely dehydrated tar, and the mixture is distilled, the ammonia found in the aqueous distillate will be very greatly in excess of that in the original liquor. It would be worth while investigating the limitations of this formation of ammonia, and to which of the nitrogenous constituents of tar it is due.

Chapter IV. treats of the "Applications of Coal Tar without Distillation." These are given as: (1) In the manufacture of illuminating gas—a question which is certainly not dealt with in a masterly manner by the author, (2) as fuel, (3) as a preservative of timber, stone, iron, &c., (4) in the manufacture of roofing felt, (5) as a cementing material in briquette-making and the like, (6) in road-making and improvement, (7) in making asphalt and pitch otherwise than by distillation, (8) as an antiseptic, (9) as a denaturant of alcohol, and (10) for the manufacture of coke, soot, or lampblack. On the whole, few of these applications are well handled, and in regard to road-making, the standards adopted by the Road Board do not appear to be referred to, though they have now for some years past governed the greater part of the extensive utilization of tar for road construction and maintenance throughout this country, as well as in many places abroad. In fact, the author makes the totally incorrect statement that "special prescriptions for the quality of the tar for spreading on roads have not been issued by public authorities, except in the United States." Yet we believe that the first issue of "General Directions and Specifications relating to the Tar Treatment of Roads" was made by the Road Board of Great Britain as early as 1911.

The fifth chapter is on the "First Distillation of Coal Tar." It opens with historical notes, in which Haskins's patent specification of the year 1746 for extracting a spirit or oil out of tar is quoted as disclosing knowledge thus early of the principles of the distillation of tar, though it said that it is possible that wood tar rather than coal tar is alluded to in this patent. Distillation of coal tar, as distinct from Stockholm tar, is, we believe, first clearly indicated in the 1785 pamphlet on coal tar and coal varnish as made at that date by the Earl of Dundonald, and it is very doubtful if Prof. Lunge is right in saying that Accum, in 1815, was the first to boil down coal tar in closed vessels or stills. It would, however, be quite correct to say that it was not until Accum's time that coal tar was distilled on anything approaching a really extensive scale. The descriptions of tar-stills and accessory plant given by the author are quite good, though in regard to the newer types very little definite information is given as to their actual use and performances on tar-works. Especially is this the case in regard to the coil-stills now so largely used for the early stages of tar distillation or dehydration.

Chapter VI. relates to pitch, and includes, somewhat anomalously, methods of testing refined tar and tar varnishes. So-called "tar-pavement," or artificial asphalt, is, more appropriately, also dealt with in this chapter. The incidence of pitch-cancer in briquette-making works is referred to in a less superficial manner than "tar-poisoning" in an earlier chapter, though there is again no mention of the researches of Dr. Ross on this question.

The seventh chapter is on "Anthracene Oil," and leaves little to be desired. The eighth chapter treats of "Creosote Oil," including its storage, transport, re-distillation, use for the preparing of antiseptics, and use as a lubricant, lighting agent, furnace fuel, Diesel-engine fuel, timber-preservative, and raw material for the production of lamp-black. On the whole, this chapter is one of the best in the book.

In the ninth chapter, the working-up of carbolic oil, and the manufacture of carbolic acid, cresols, and carbolic preparations are described as fully as can be desired. The latter portion of this chapter refers to naphthalene. Curiously enough, the real reason of the disuse of the albo-carbon light—viz., the general adoption of the incandescent mantle—does not appear to be mentioned in the two or three pages in which the use of naphthalene for carburetting gas is described and discussed.

Chapter X. refers to "Light Oil," and gives an account of its working-up. It includes also the working-up of the "first runnings" proper, and the recovery of the pyridine bases. Chapter XI. takes up the working-up of light naphtha into final products, and embodies a great deal of information which might scarcely be expected under this general heading—such as the use of benzol for illuminating and carburetting purposes and as a motor fuel. There is, of course, nothing on the extraction of benzol and toluol from coal gas which is not already known to most readers of the "Journal," as it is a matter on which at the present time Prof. Lunge could scarcely receive private information either from British or German sources.

This is the concluding chapter of the two volumes of the work which are devoted to coal tar. They are indispensable to tar distillers, and to many gas managers, gas chemists, and users of coal tar and its primary products. The fact that the work is not equal in many respects to our reasonable expectations arises largely from its ambitious character and the renown of the author. There is no rival work, and we do not call for one; but we hope that Prof. Lunge will be spared to amend subsequent editions by the drastic deletion of obsolete matter and the incorporation of the latest information which tar-works managers and chemists can afford him.

At times, Prof. Lunge's command of the English language now seems less good than formerly, and there are numerous misprints of English proper names. A competent publisher's reader should, however, have saved the author being made responsible for such an expression as: "Witzek points out that thiophen is just very stable at high temperatures! Daub's patent lapsed already after twelve months."

We shall refer to the "Ammonia Section" of Prof. Lunge's work at an early date.

A Bequest by the late Mr. James Forrest.—Mr. James Forrest, the late Secretary of the Institution of Civil Engineers, who died in March, after having been connected with the Institution for 75 years, left estate valued at £13,688, with net personalty £13,574, bequeathed £500 to the Institution, to be added to the James Forrest Lecture Trust Fund, and also a number of testimonials presented to him by Past-Presidents and others, which he asked the Council to have exhibited every year on the occasion of the James Forrest Lectures.

Wales and Monmouthshire Institution.—The meeting of the Wales and Monmouthshire District Institution of Gas Engineers and Managers will be held at Merthyr on Wednesday of next week (the 16th inst.). The business includes the election of officers for the ensuing year, and papers by Mr. W. C. Jackson, of Neath, on "Coal Gas as a Substitute for Petrol in Motor Vehicles," and by Mr. J. Mogford, of Briton Ferry, on "Sulphate for Allotments." The President is Mr. J. E. Kenshole, of Merthyr. After the meeting, the members will be the guests at luncheon of the Chairman and Directors of the Merthyr Tydfil Gas Company; and in the afternoon there will be a visit to the gas-works.

GAS CHEMISTS' HANDBOOK.

SOME remarks on a paper bearing the above title have already appeared in the "JOURNAL" [Vol. CXXIX, p. 28]. While the paper was more or less of a feeler to see what should be included in a volume justifying the title, in the work under review, the preliminaries have evidently been found satisfactory; and the present handbook is in book form, running to some 350 pages, complete with index and several useful tables. It has been compiled by a Committee of the American Gas Institute, and sets out to give standard methods for the usual operations in a gas-works laboratory. Although too much standardization is objectionable, in this case it is not overdone, as in most cases several methods are given, suitable both for where extreme accuracy is required as well as the accuracy necessary for routine testing.

The text is based mainly on the work of the American Bureau of Mines and the Society for Testing Materials; and it may be said at once that while the volume has been written chiefly for gas chemists on the "other side," their *confrères* this side will find it a valuable addition to their workroom, not only for methods to adopt, but also for knowledge of other available processes.

The scope of the work having already been given ["JOURNAL" *supra*], attention may now be directed to a few points not previously mentioned. Very minute instructions are given as to coal sampling, and rightly, provided that the coal is purchased under some definite specification. But how often is this so? While there are cases of coal being bought on a calorific basis, the majority of works buy coal in the board room, but get—what they receive; and by the time the analysis has been completed, the coal is either stacked or burned. Therefore, in the absence of any definite specification, endless trouble would arise in convincing the coal merchant that what he sent was not what was bought. Samples may be kept; but if nothing definite has been purchased, nothing definite can be claimed. All this shows the advantage of buying coal to specification. Where the sample of coal is crushed by a mill, one little source of error is often overlooked in the fact that if the teeth are getting worn, small pieces of iron are likely to rub off and contaminate the sample.

In estimating the moisture in coal, drying at a temperature of 104° to 110° C. for 1 to 1½ hours is recommended. This higher temperature of 110° C. (230° Fahr.) is, however, more than likely to introduce several disturbing factors; and it would appear better to absorb the water by calcium oxide. For volatile matter, an alternative method to that of heating in a muffle is to heat the crucible containing the coal over a Meker burner under definite conditions at a temperature of 900° to 950° C., determined by a thermo-couple passing through the perforated nickel cover; the junction of the couple being placed in contact with the centre of the bottom of the platinum crucible. The temperature may also be indicated by the fusion of pure potassium chromate (940° C.) in the covered crucible. The important point here is the fixing of the temperature, as although consistent results may be obtained in duplicate tests by heating for 7 minutes over a definite flame, as was originally suggested by the American Committee on Coal Analysis, there is with this method always the doubt of the gas on different days giving more or less a different temperature.

For calorific power determination some form of bomb with combustion in oxygen is considered preferable; precautions being taken against heat being generated by excessive stirring of the water. Some other more simple form might also have been given a definite place, as with the bomb the procedure is highly tedious, and the calculations are complicated; and for general routine or checking work, the slight increase in the degree of accuracy obtained by this method is not worth the extra time and trouble involved. The bomb washings are utilized for the determination of sulphur in the original coal.

Gas oil is distilled at the rate of 1 c.c. per minute from a 100 c.c. Engler bulb of the dimensions now generally adopted as the standard here in England. The content of sulphur in the oil is found by burning the oil in a bomb calorimeter and, after the combustion, allowing the gases to slowly escape through a 10 p.ct. solution of sodium carbonate. The bomb is then washed out, and the united solutions boiled until the alumina and iron are precipitated, and then finished as usual. An alternative method consists in mixing the oil with magnesium oxide, and heating with nitric acid (sp. gr. 1·48) for two hours on a sand bath. The excess of acid is evaporated off by a direct flame, and the residue heated until the nitrates begin to decompose. After cooling, a further 10 c.c. of acid are added, the heating is continued for 15 minutes, the residue is evaporated to dryness, and finally heated till the nitrates are all completely decomposed. The residue is taken up with 1·124 sp. gr. hydrochloric acid, and the sulphates are precipitated as the barium salt.

In finding the value of new oxide of iron purifying material, by an experimental fouling, dry sulphuretted hydrogen from a "Kipp" is passed over the oxide for one hour; the increase in weight giving the sulphur taken up. In the writer's opinion, this test deserves more detailed attention. Is it not often the case that at the end of the hour the oxide is still doing good work, even though all the sulphuretted hydrogen is not being taken up? If the stopping of the experiment depended on a limit placed on the grams of H_2S passing the oxide, instead of on the duration of the test, more valuable figures would be obtained, and, moreover, the results should show some relation to actual practice.

The total sulphur in spent oxide may be found by fusion with sodium peroxide in a nickel crucible, taking the melt up with water and adding sufficient (1 to 3) hydrochloric acid to precipitate the iron and yet not destroy the alkalinity of the solution. The latter is boiled, the iron oxide filtered off, and the sulphate determined either gravimetrically (nitric acid oxidation) or volumetrically. In the latter case, the filtrate from the iron oxide precipitate is treated with barium chromate (40 grams dissolved in dilute HCl), shaken for a few minutes, and then dilute ammonia added slowly until the colour changes to a pure yellow, indicating the complete precipitation of the excess of barium chromate. The solution is filtered through a dry filter, neglecting the first runnings, an aliquot portion transferred to a stoppered bottle, acidified with HCl, and, after adding solid potassium iodide, titrated with N/10 thiosulphate. The method given for differentiating between tarry matter and sulphur is oxidation of the carbon tetrachloride or bisulphide extract.

For collecting samples of gas for analysis, the tubes recommended are not the best. It is much more satisfactory to use tubes fitted with two-way taps; so that air in the small length of capillary tube may be displaced either by the issuing gas or by mercury. The ease of manipulation, in this latter case, is far ahead of the others, although the type capable of being "sealed off" may be more suited for travelling long distances.

The three types of apparatus illustrated for the complete analysis of gas are Elliott's, Morehead's, and a modified Hempel. The first two are preferable; but the writer considers Hempel's is likely to be an endless source of doubt, owing to the disadvantage of having to keep disconnecting capillary tubes, and this notwithstanding that the one shown is modified by attaching the potash pipette permanently.

Where oxygen is necessary for an explosion, this, in the absence of a cylinder of the gas may be generated on the spot my means of potassium chlorate and manganese dioxide placed in a retort and heated by a small flame. The determination of calorific power is carried out according to the prescription of the American Gas Institute Committee.

In the section devoted to the testing of ammoniacal liquor, the methods of sampling have already been given ["JOURNAL," *supra*]; and it is worth noting that the results for ammonia are expressed as a percentage instead of the practically meaningless "ounce strength." A handy table is given for correcting to 60° Fahr. the readings of the Twaddel hydrometer where the latter is used for finding the specific gravity of liquor. The methods of general analysis are those given by the Chief Inspector of Alkali Works. As a quick method of finding the quantity of H_2S and CO_2 in liquor the latter is distilled into strong ammonia solution, which absorbs the evolved H_2S; the CO_2 being retained in the liquor in the distilling flask by the previous addition of ammoniacal calcium chloride. The carbonate so formed is afterwards filtered off and titrated with acid. In cases where the outlet liquor of (say) a desulphurizer may differ in volume from the inlet liquor, owing to dilution, the best way of expressing the results is as a ratio to the free ammonia present.

For the determination of ferrocyanides in sulphate, rather a neat method is given. One hundred grams of the sulphate are dissolved in hot water, filtered hot, and washed with hot water till free from sulphate, the filter and residue are put into a flask containing about 50 c.c. of water, and the latter boiled so as to separate the residue from the paper as much as possible. To the contents of the flask is then added N/50 sodium hydroxide until the blue is entirely decomposed; the flask being kept warm. While constantly shaking and heating, the excess sodium hydroxide is titrated with N/50 acid; the end point being reached when the dark green colour in the solution first appears.

For cyanogen in the spent oxide the Feld-Witzeck method is recommended.

Coming to p. 173, there is given a method for the estimation of naphthalene in gas which, on reading, appears rather formidable. The method consists, briefly, in passing from 15 to 60 c.ft. of gas through a saturated solution of picric acid containing an excess of acid as crystals. The contents of the wash bottles are then extracted with benzol, the benzol separated, and titrated for total picric acid. An aliquot part of the benzol solution is next evaporated to dryness, with obviously due precautions, by heating and passage of dry air, the residue dissolved in 95 p.ct. alcohol, and the picrate reprecipitated with water. The precipitate is filtered off, and the filtrate titrated with sodium hydroxide—this giving the free picric acid; the difference being that combined as picrate. While the method is presumably accurate theoretically, one has to remember that the day consists of but 24 hours, and, faced by the several filtrations and manipulations, one is left wondering whether the compilers have ever heard of Colman and Smith's method, which at least should be as accurate as the one being discussed, and, further, is eminently more suitable for routine testing, by which, after all, in the majority of cases, the methods given must be judged.

Chapter IV. deals with tests of tar products and light oils, and therefore at the present time is of more than general interest. For distillation tests, the usual standard Engler flask is adopted, the temperature at which the first drop leaves the lower end of the condenser being considered the initial boiling point of the liquid. As nearly every chemist seems to have his own pet method for washing the crude products, the one recommended here as a standard may be quoted. "Three hundred c.c. of the material to be tested are measured into a Squibb type separating funnel, about 4 c.c. of 66° Baumé acid added, and the contents of the

funnel thoroughly shaken; care being taken to avoid piling up of pressure in the funnel, due to heat of reaction. After settling for five minutes, the lower layer of acid is drawn off, and a second wash of 17 c.c. of acid is applied and likewise removed; the total amount of acid used being approximately 1 lb. per gallon of material. The last acid wash is followed by a treatment with 10 p.ct. caustic soda solution to alkaline reaction. This soda is allowed to settle, and is drawn off." This is more or less the usual practice; but some information would have been useful as to the prevention or separation of the emulsions that very often form when the soda solution is applied, and from which with some liquids there seems no escape.

Having already overstepped our space limit, we must here leave the volume; but it may be said that, in addition to the usual tests as generally applied on the works, some considerable space is devoted to the testing of concrete, lubricating oils, iron and steel, fire-clay, and water.

The importance and value of the book are therefore readily apparent. Moreover, the volume is one that gas-works chemists will wish to possess, although, with the Committee, they may not be prepared to recommend that all the methods contained therein be stamped with approval without further revision.

FURNACE DEMONSTRATIONS AT MANCHESTER.

The efforts of the Chairman (Alderman W. Kay, J.P.) and members of the Manchester Corporation Gas Committee to bring to the notice of important engineering and armament firms in Lancashire and the district the advantages of gas as a furnace fuel, were rewarded on Friday by an exceptionally large muster of technical experts and eminent engineers at their premises in Whitworth Street West, to witness practical demonstrations by Messrs. John Wright & Co., of Birmingham, and the value and utility of gaseous fuel in the melting and heat treatment of metals used in the manufacture of munitions of war, and for all industrial purposes. Over 600 invitations had been issued to users and non-users of gas, by the Superintendent of the Department (Mr. F. A. Price); and a very satisfactory feature of the exhibition was the keenness with which the works' foremen and skilled artizans engaged in local engineering shops (who had been specially invited) followed the proceedings. The Gas Committee had thoughtfully extended an invitation also to the President (Mr. W. Whatmough, of Heywood) and the members of the Manchester District Institution of Gas Engineers, a large number of whom availed themselves of the courtesy. Indeed, almost every munition area in Lancashire and Cheshire seemed to be represented; and Mr. J. F. Davies (one of the Directors of Messrs. John Wright & Co.), Mr. F. W. Kenyon (the Commercial and Sales Manager of the firm), Mr. Shipley N. Brayshaw, and Mr. E. Russell Brayshaw (of Messrs. Brayshaw's Furnaces and Tools, Ltd., Manchester, who are associated with Messrs. Wright & Co.) had a busy afternoon demonstrating the uses to which their different furnaces, a number of which were exhibited, could be put. The exhibition will remain open for three weeks, from 9.30 a.m. to 5 p.m.; and manufacturers are specially invited to make use of the occasion for the purpose of testing the furnaces for themselves, by their own staff of workmen, with their own material, and under their own conditions. A varied programme of demonstrations has been arranged.

Alderman Kay, who briefly welcomed the visitors in the name of the Gas Committee, said the Corporation, as the gas suppliers of the district, were thoroughly alive to the importance of developing the use of gas for both small and large consumers; and with this idea before them, they had decided to equip these premises as a permanent showroom for industrial furnace work, where manufacturers would be able to inspect the newest and most up-to-date types of apparatus for almost every kind of process. The Gas Committee realized the importance of being as helpful as they possibly could be to the consumers, especially in these difficult times. After referring to the importance of manufacturers keeping themselves in touch with the newest conditions of working, he went on to emphasize the fact that gaseous fuel was, and is, a more controllable fuel than either coal or coke; and that, while many substitutes had been tried, it was now universally conceded that gas was capable of meeting almost every kind of modern fuel requirement. By the use of gas for industrial purposes, complete control of the temperature in the furnaces in which the processes were carried out was secured; and workmen were thus able to maintain within the furnaces the precise heating conditions necessitated by the process in operation. This made for economy and better working conditions. Indeed, it was now well recognized that gas as a furnace fuel had been the means of dispensing with much arduous and unhealthy labour, and likewise of obviating the pollution of the atmosphere, which so frequently resulted from the use of coal and coke fired furnaces. The Government had recognized this in fitting up the new National Munition Factories in various parts of England; the result being not only the production of the highest quality of work in the shortest possible time, but greatly increased output under more healthy conditions than were hitherto attainable. He had been reminded that in one of the Government factories something like 500,000 c.ft. of gas an hour was consumed. If the Manchester Corporation could obtain a few consumers like this, the price of gas in the city would soon be reduced. He assured them that the Gas Committee were desirous to give the best service possible. It was, he reiterated, desirable that gas should take its proper place as a fuel; and the sooner the Corporation of Manchester recognized the necessity of fostering the industry, of which it had the monopoly in the city, the better it would be for the public and all concerned. He concluded with a word of thanks to the makers of the apparatus on view that afternoon, and sincerely trusted their efforts would be rewarded by good attendances at the demonstrations.

Mr. Shipley N. Brayshaw, who proposed a hearty vote of thanks to Alderman Kay, alluded to that gentleman's whole-hearted interest in the gas industry generally, and Manchester in particular. He said he had displayed great keenness in the development of the furnace department, and encouraged it by every means in his power. Gas, as the last speaker had well said, had undoubtedly played a very important part in the conduct of the war; and it was largely due to these efforts that the supply of munitions was so satisfactory to-day.

Mr. Hans Renold (founder of the firm of Hans Renold, Ltd., chain makers, of Didsbury, Manchester), seconded the vote of thanks, and extended a hearty invitation to those present to inspect his gas-driven works at a convenient opportunity, and expressed himself as an enthusiastic believer in the advantages of gaseous fuel over any other form of firing. He paid a tribute to Alderman Kay's zeal in encouraging and supporting progressive ideas whenever they were brought before him.

Alderman Birtles (Deputy-Chairman of the Gas Committee), who supported the vote, spoke in similar terms of Mr. Kay's services to the Gas Department, and said that he had given the new furnace department enthusiastic support from its inception.

Technical demonstrations were given at the conclusion of the opening proceedings; a large number of engineers and others remaining several hours to witness the experiments.

RECOVERY OF SULPHUR FROM COKE-OVEN GAS.

By D.R.W.

It has long been recognized that the foul gas from the carbonization of coal contains sufficient sulphur, as sulphuretted hydrogen (H_2S), to meet the requirements of the ammonia present, to convert it into the form of sulphate. Attempts have been made—notably by Feld and Burkheiser—to bring about the formation of ammonium sulphate from the ammonia and sulphuretted hydrogen present in coal gas without making use of sulphuric acid as an intermediate in the process. These attempts have met with a certain measure of success; but up to the present they have not been adapted to large-scale working to any great extent.

All gas-works, of course, recover the sulphur from their gas; and when this is effected by means of oxide purifiers, the spent oxide is sold to the acid-makers and is converted into sulphuric acid, which can then be used for the absorption of the ammonia, with the production of sulphate. In the absence of a reliable process for what one might term the "Direct Recovery of Ammonia as Sulphate," the above, as carried out on average British gas-works, is perhaps the simplest and most economical method of utilizing the sulphur in the gas.

The following figures will show that with an average coal, containing about 1·8 p.ct. of sulphur, the gas contains sufficient H_2S, which, if converted into sulphuric acid, would completely satisfy the requirements of the sulphate of ammonia plant. In fact, in this particular case there is a considerable surplus, which (as all the figures are based on theoretical considerations) will amply allow for working losses.

Ammonia (NH_3) in the foul gas . . = 432·6 grains per 100 c.ft.
Sulphuretted hydrogen (H_2S) in the foul gas = 690·0 " " "

Presuming, for purposes of calculation, that one ton of coal yields 10,000 c.ft. of gas, we find that:

1 ton of coal yields 43,260 grains, or 6·18 lbs., of NH_3,
and 69,000 " " 9·85 " " H_2S,

the latter being equivalent to 9·28 lbs. of sulphur. Now 9·28 lbs. of sulphur would produce 28·42 lbs. of sulphuric acid, whereas 6·18 lbs. of ammonia only require 17·81 lbs. of acid to convert it into ammonium sulphate.

If the gas-works of the country were the only consumers of sulphuric acid, then from the above one can see that they would be practically self-supporting. As all are aware, however, they are not the only consumers; and sulphur has to be obtained for the manufacture of acid from sources other than spent oxide. The chief of these is pyrites. Now pyrites has practically all to be imported; and at such a time as the present, when the Government of our country is doing its utmost to reduce our imports to a minimum, it is surely worth while to try and utilize the sulphur which is already in the country, and which at present is being lost to the extent of more tons per day than it is at all pleasant to think of.

I refer to the sulphur that is found in coke-oven gas. Up to the present, very few coking plants are equipped with sulphur-recovery plants. Only those the gas from which is used in gas-engines or for lighting purposes, have so far done anything in this particular direction. In such cases, of course, only part of the gas is purified. That which is utilized for heating the ovens, or for boiler firing, is burned in the crude state. Take, for example, a fifty-oven plant. Such a works will carbonize about 300 tons of coal per day, which, at the rate of 9·28 lbs. of sulphur per ton, is equal to 2784 lbs. of sulphur in the gas per day. If any of this gas is purified (for power or lighting purposes), it will not amount to much more than one-third of the volume; so that no less than 1856 lbs. of sulphur would be lost per day, or the equivalent of a little more than 2 tons 10 cwt. of pure sulphuric acid.

Of course, if oxide purifying plants were installed to deal with

the whole of the gas from our coking plants, the acid situation would not be immediately relieved. Those conversant with purifying practice as carried out on gas-works know that the complete saturation of oxide with sulphur (say, up to 50 p.ct.) takes a considerable time. It must be remembered, however, that with the gas-works people, they have a certain standard of purity to maintain; and in order to secure that the gas leaving their purifying boxes is up to the standard, they need to have a plant of large and ample capacity. They have also to change the flow of the gas through the boxes very frequently, which of course means that, although they carry out the purification very efficiently, the sulphur they recover is evenly distributed through a large bulk of oxide. Now, on a coking plant there would be no standard of purity to maintain; and consequently the sulphur could be concentrated as much as possible in any one particular box—no great crime being committed if a certain amount of sulphur did pass away in the "clean" gas. It would be necessary, of course, to adopt the method of revivification *in situ*; and here, again, the coking people would have the advantage that no regard need be paid to any decrease in the quality of the gas due to an excess of air being used.

One important point which would require attention before installing such a plant would be to ascertain whether the existing exhausters would be capable of dealing with the extra back-pressure thrown by the boxes. No definite figures can be given for the back-pressure thrown by oxide purifiers, as there are so many influences at work. Thus the size of the boxes, the nature of the oxide, and the manner in which it is used, together with the rate of flow of the gas, would all affect it.

We are told that the gas engineer is satisfied if he sells his spent oxide at a price equal to that at which he bought it; and one occasionally hears of others who make a profit on their purification plant. The writer is of opinion that, with sulphur at its present price, together with the advantages the purification of coke-oven gas has over that of town gas, the process should prove a very profitable investment to coke-oven people. Even should the dividends not be swollen, the chances of a loss are very small indeed; and the saving in tonnage in our shipping which would be effected by the wide application of the process would greatly help our country in the present crisis.

WAR PROBLEMS AFFECTING THE GAS INDUSTRY

By Thos. Newton.

Through the manifold activities of those engaged in the various gas undertakings throughout the country, gas is performing a useful and conspicuous national service in many directions; but whether the strenuous efforts that are being put forth are appreciated and appraised at their proper value, is an open question. It is surely only reasonable to suppose that an important industry, like the gas industry, which is engaged in work of a national and municipal character, is entitled to every encouragement and assistance from the powers that be.

Restricting the Manufacture of Gas-Fittings.

The recent order issued by the Minister of Munitions, at the request of the Director-General of National Service, imposing the restricted manufacture of gas-fittings is surely misconceived. The "manufacture of gas-fittings" is certainly a comprehensive phrase; and the proposed restrictions will have a crippling effect on an industry which, in the national interest, should be helped rather than hindered. Presumably the order will further restrict the manufacture of burners; and possibly it may be stretched so as to include various kinds of apparatus. This will certainly result in a reduced supply of gas. Any restriction on the manufacture of burners is singularly inopportune just at present. Oil-washing has rendered obsolete thousands of burners which require replacing with incandescent burners; and the number is likely to increase, rather than decrease, in the near future. Unless an adequate supply of incandescent burners is forthcoming to take the place of those which have been and will be rendered useless, simply on account of gas undertakings throughout the country performing an urgent national service, a deep sense of injustice will be created that could be easily avoided. Consumers will feel they are being unjustly penalized; and the shoal of complaints that will ultimately occur will absorb far more labour to deal with (more or less ineffectually) than would be required to manufacture the burners in the first place. To save labour at one end, by restricting the manufacture of a given commodity, and by so doing create a correspondingly greater demand for labour at another end is certainly not in the national interest. Neither does it solve any problem. All that is accomplished is a transference of the original problem in an aggravated form to another quarter; and if the stock of labour in this latter quarter happens to be at all depleted, the problem is thereby rendered the more complicated.

Gas a Labour-Saving Agent.

Gas is such a labour-saving agent that any tendency in the direction of its restricted use is difficult to reconcile in the light of the Government's stated requirements. Here is a commodity which saves endless labour on every hand. By its use an immense amount of haulage of crude coal to individual consumers is entirely obviated—thus releasing labour more urgently required for other purposes. For cooking, heating, lighting, and the thousand-and-one uses to which it may be put, it yields a maximum result for the barest minimum of labour. The labour saved to the nation by the use of gas for all conceivable purposes has not yet been fully realized; and it is a demonstrable proposition that the extended use of gas would bring about further labour economies, and in this way secure to the nation a greater accession of labour strength. Yet the policy of restriction seems to be preferred. On the ground of fuel economy alone the claims of gas are valid and well-founded; but when these claims are considered from various standpoints—national, municipal, industrial, agricultural, and domestic, among others—the importance of the industry is at once seen in its true perspective. An industry, such as this, which is capable of satisfying so many essential necessities and requirements, surely needs no vindication. On the contrary, it is worthy of all encouragement. Anyhow, it deserves more encouragement than is being meted out to it at present.

Government Attitude Contrasted.

If the Government is so enamoured of fuel and labour economizing schemes as to send the Parliamentary Secretary to the Board of Trade to Manchester to discuss the interlinking of the Lancashire and Cheshire electrical undertakings, with a view to effecting economies of labour and fuel during the war, it might do worse than extend its consideration to the gas undertakings throughout the country that for years have been responsible for the saving of much labour and fuel. It might also take the precautions necessary to ensure that this saving shall not be unduly interfered with, but, on the contrary, extended. No thanks are due to the Government for their action in this matter; for it is probably only the gigantic expense that would be involved which has prevented the formation of a huge competitive combine opposed to the very industry above all others which has been straining every nerve to assist the Government to the utmost of its ability. Competition is all very well in its way. But there is a time for everything; and this is no time to contemplate the creation of a potential competitor on a huge scale, to the detriment of another industry which is devoting all its time and efforts to the welfare of the nation. Gas undertakings have sunk a considerable amount of capital in providing plant, and initiating certain processes for the benefit of the country, without expectation of fee or reward; but it certainly looks for, and expects to receive, fair treatment at the hands of the Government. What is wanted is a little more co-ordination in high quarters, and a little more co-operation between the Government and essential industries.

Calorific Standard Orders and Applications.

The Local Government Board have made orders under the Gas (Standard of Calorific Power) Act, 1916, for the Bradford Corporation and the Malvern Urban District Council. In each case the standard is 500 B.Th.U. The clause with regard to pressure in the Bradford Order reads as follows: "The provisions of the Local Acts and of the Confirming Act of 1875, so far as it relates to the Order of 1875, which are now in force with respect to the pressure of gas supplied by the Local Authority, shall be varied so as to require that all gas supplied by the Local Authority to any consumer of gas shall be supplied at such pressure as to balance a column of water not less than 15·10ths of an inch in height at the main as near as may be to the junction therewith of the service-pipe supplying such consumer: Provided that, in the case of any area within the gas limits of the Local Authority which is situate more than 50 ft. below the level of the station governor at the gas-works from which such area is supplied, such of the provisions above referred to with respect to the pressure of the gas supplied by the Local Authority as are now in force within and applicable to the area shall be deemed not to have been varied as aforesaid, but shall be deemed to remain in force, and to continue to apply to, and have effect within, the area, as if this Order had not been made." The Board of Trade have made Orders asked for by the Exeter Gas Light and Coke Company and the Brighton and Hove General Gas Company. They have also received applications for a standard of 500 B.Th.U. from the Sheppy Gas Company and the Llanelly Gas Light Company.

The Need for Coal Economy.—In our editorial columns to-day, there is an article which deals with this question in relation to gas-works consumption. "The Iron and Coal Trades Review," in a leading article last Friday, made the following comments: "The need for economy is greater to-day than ever, for it is unlikely that under present circumstances there will be any marked increase in the supply available during the summer, as merchants are very much in arrears with their orders, and reserve stocks at gas-works are substantially lower than usual at this period, so that the production will continue to be readily absorbed, especially so as outputs are to be further reduced by the calling-up of men from pits. With similar conditions prevailing, it is very possible that by next winter the public will be put on 'rations' of house coal, in order to enforce strict economy, and to reserve adequate supplies for other purposes, and gas may have to be utilized to an even greater extent than at present, bearing in mind that one ton of average gas coal will yield, roughly, 12,000 c.ft. of gas and 14 cwt. of coke, besides valuable residuals for the manufacture of high explosives."

EASTERN COUNTIES GAS MANAGERS' ASSOCIATION.

Fifty-Fifth General Meeting held in London.

The General Meeting of the Association was held in London last Thursday. The Holborn Restaurant was the place of meeting; and the new President (Mr. John Terrace, of Grimsby) was in the chair. There was a large gathering of members, associates, and friends. Among them were the President of the Institution of Gas Engineers (Mr. A. E. Broadberry), Mr. F. W. Goodenough, the Chairman of the Executive Committee of the British Commercial Gas Association, and Mr. Walter T. Dunn, the Secretary of the Institution.

LUNCHEON.

Before the business proceedings commenced, the members and visitors were entertained at luncheon by the Chairman (Mr. William Bennett) and Directors of the Great Grimsby Gas Company. Through other engagements, the Chairman and his colleagues were unable to attend; but their guests thoroughly enjoyed their hospitality. In their absence, the President represented them in the chair.

After the loyal toast had been honoured,

Mr. F. W. Goodenough said he was proud to have the privilege of proposing the next toast on the programme, that of "Success to the Eastern Counties Gas Managers' Association," coupled with the name of the President, Mr. John Terrace. The toast was, therefore, both a collective and an individual one. Speaking of the individual, he was sure they were delighted to be there meeting under Mr. Terrace's presidency. Those of them associated with the gas industry in London were not strangers to Mr. Terrace, nor he to them; and those who were London men were glad indeed to see him there that day. They congratulated him upon occupying the chair in succession to Mr. Broadberry, who, they all knew, was at one time Mr. Terrace's chief, and was now proud to be his colleague. From the collective point of view, in proposing success to the Association, he would say that one of the lessons of the war undoubtedly had been the value of combination as illustrated in Associations such as this, and in the more National Association of which the Association formed an integral part. For more than two years, they had been passing through times of very grave anxiety and difficulty; and the difficulties, so far as the gas industry was concerned, did not grow less, but rather became greater as time went on. One of the results of these anxieties and difficulties which called for collective action had been to bring into existence another Association—a combination of all the Gas Associations of the country. That was the National Gas Council. He saw upon the programme that day a question for the National Gas Council; and as he should not be able (having other engagements) to stay for the afternoon meeting, he thought perhaps they would allow him to touch upon the agenda in that respect, and upon one other matter which he knew was engaging the anxious attention of the gas managers of the country—that was, the question of recruiting, or rather the reservation of men from recruiting.

THE NEW SCHEDULE OF PROTECTED OCCUPATIONS.

So far as it affected the gas industry, the new Schedule of Protected Occupations would come into force at the end of that week, and naturally all had been examining the schedule very carefully to see to what extent they were affected—whether it meant any more combing-out from the gas industry, or whether it meant reasonable protection for the industry in the future. While the new schedule appeared on the face of it to be unsatisfactory in that it only referred specifically to "certified" undertakings, they had the assurance of the Ministry of Munitions Labour Department that it is not intended that protection should only apply to occupations in gas-works that were already officially certified, because they were prepared to consider the claims of all gas undertakings to certification and protection wherever men had been badged, or wherever in any way the undertakings were essential to the output of munitions in the country. There were very few gas undertakings that could not, in some shape or form, rightly claim to be essential to the output of munitions. He saw one of the principal officials at the Labour Department of the Ministry of Munitions the previous day, who told him that the Ministry desired to protect those who had played the game—who had done their duty in regard to releasing men for enlistment, and they did not intend that any technicalities should stand in the way of protecting the essential men for gas undertakings—men who were really essential from the point of view of the Ministry of Munitions. So if any of those present found themselves in any grave difficulties with their recruiting officers, they would be well advised to let the National Gas Council get into communication with headquarters for them, in order to see what could be done to secure such protection as they ought to have.

METAL SUPPLIES AND THE NEEDS OF THE COUNTRY.

Now in regard to materials. They had on the programme a resolution asking the National Gas Council to take up the question of necessary plant for gas-works. He should like to say that it was no use whatever asking the National Gas Council to go to the Ministry of Munitions with a vague resolution of this sort. It was necessary to have chapter and verse, specific instances, and detailed facts before they went to the Ministry to ask for assistance for any undertakings. He was recently one of a deputation, with the Society of British Gas Industries, on this very question of materials; and they were then told very emphatically what difficulties there were at the present time in supplying the necessary metals even for Government work—one instance being given in regard to copper tubing, in respect of which the geyser makers were much troubled. They were unable to get it for the repair of the interior of geysers. In reply to their representations, the member of the staff of the Ministry whose duty it was to deal with this matter said: "When I tell you we cannot supply copper tubing to the railway companies for repairing their express locomotives, you can understand our difficulty in supplying copper tubing for your geysers." The difficulties of the Ministry were very real. They were not in the least unsympathetic. They were trying to help everybody; and when twelve things were wanted, and only six were available, neither the Ministry nor anybody else could make the goods go all round. But if any hard case—any really serious case—were reported to the National Gas Council, they would always do their best to get assistance for those in trouble from the Department, which was itself in serious trouble through having to meet so many conflicting claims. So he would ask the Association not to send up simply vague resolutions, but to give them specific instances.

THE BRITISH COMMERCIAL GAS ASSOCIATION.

Speaking in his capacity as Chairman of the Executive Committee of the British Commercial Gas Association, he should like to thank the members of the Eastern Counties Association for their continuous support during the war. Many undertakings in the Eastern Counties had been peculiarly hard hit by the circumstances of the war; and the Executive Committee of the "B.C.G.A." appreciated the continued and increasing support they had had from undertakings in the eastern counties. They only quite recently had a new subscribing undertaking—a close neighbour of Mr. Terrace's. This continued and growing support was due, if he might say so, to the fact that the Eastern Counties managers were good business men, who did not look only to the immediate circumstances of the day, but to the future as well. It was to the future that the British Commercial Gas Association were principally devoting their energies at the present time; and he hoped they would be able to render a good account of the moneys they expended on behalf of their undertakings and the industry generally.

The toast was honoured with acclamation.

Mr. Thomas Glover to Advise the Coal Controller regarding Gas Coal Requirements.

The President said it always appeared to him to be a somewhat peculiar position for a body of men who were meeting together to be, in the first place, drinking their own healths, and, in the second place, for the President to have to reply on their behalf. He did not, however, propose to trench upon their time, as they would be having more from him at the business meeting. He should, however, like to thank Mr. Goodenough for his kind remarks regarding the Association collectively, and for what he had said concerning him personally. His (the President's) connection with London was a pleasant memory. He was sorry to say that time was now rolling on since he broke his connection with it. But the tie was still very strong; and he never missed an opportunity of renewing the very pleasant associations he made while with Mr. Broadberry at Tottenham. He had arranged that they should trespass further upon this part of their proceedings. The Coal Controller (Mr. Guy Calthrop) paid the industry the compliment, in connection with the disposal of coal, of consulting it as to its requirements; and it was a great honour that a member of their own Association should be asked to confer with him, and advise and give him information. That adviser was Mr. Thomas Glover [Applause]: and they had him present with them that day. Mr. Glover found it necessary to get away, and could not remain for the business meeting; but he had kindly consented to give them before he left a little information about coal. They were all very anxious to know what was likely to be done.

The Coal Controller's Organization.

Mr. Thomas Glover (Norwich) thanked the President for the opportunity of interrupting the course of the programme to say a few words. He felt sure the members would like him to be present, to speak on the important matter of coal supplies. They were in too early a stage in the investigations to be able to give any reliable guidance as to what was going to happen; and he was not authorized to speak for the Coal Controller. He had, however, been appointed to assist him with technical advice on behalf of the gas industry; and he regarded it as an advantage that the industry should be so represented. He had rather the industry had been represented in the person of some other member; and probably his wishes in that respect would be very sincere before he had finished. Be that as it might, it was not the time to be considering personal convenience. It was a matter of giving of one's best for the national cause. He acted on this principle in the early days when the industry was requested to give of its benzol and its toluol; and now that the work had been organized, and the supervisors were not required to do so much as formerly—in fact, their duties were nearly coming to an end—he was not sorry to turn his attention to other work. He was grateful to his Board who had taken a liberal view of the matter, and had given his services to the Controller, with the only proviso that he was to sleep three nights in Norwich. He hoped he should be able to sleep. [Laughter.] He had to crush his work in Norwich into Saturday, Sunday, and Sunday night. So far as he could see at present, he had to come up to London early on Monday mornings. Now he was not entitled to give away any secrets. He could only say that the Coal Controller had a big staff of men expert in railway matters working for him and devising schemes, as well as a number of experts on steam-using, gas-making, and manufacturing generally—men whom he had chosen to represent various branches of industry.

COAL ECONOMY THROUGH BLUE WATER GAS.

There was one phase of the question about which he could speak; and his investigations so far enabled him to refer to it with some authority.

The returns that had been sent in revealed to him there were a great number of water-gas plants in the country that were not being used They were, he presumed, out of operation because the price of oil was at such an outrageous figure. This was wrong. The water-gas plants need not go out of use. He presumed most of them were working either by authority or otherwise to the 500 B.Th.U. standard. Some were working below—taking liberties and ignoring all standards. It was only right to themselves, to their companies, and to the nation that their liberty should be used in an honest way. He wanted them to make use of their liberty in the right way where they had water-gas plant. As gas engineers, they should send out gas containing the highest possible percentage of combustibles. It was perfectly wrong, injurious, and impolitic to send out gas which contained a high percentage of incombustibles. They could prevent to a great extent the introduction of inert gases, use up to 25 p.ct. of blue water gas, and still comply with the requirements of the testing authorities if they were on a 500 B.Th.U. standard, and at the same time satisfy the Ministry of Munitions. This he had proved, and so could speak from his own knowledge without any doubt whatever. Now if they could use (say) up to 20 or 25 p.ct. of blue water gas, and not employ expensive oil, they could reduce their costs, save a tremendous lot of coal, and at the same time relieve the country of the carriage of the coal. The want of rolling stock was a most important matter. It was because the southern counties who previously got their coal by water were now unable to charter ships to carry it that a great deal of the congestion, inconvenience, and delay had occurred on the railways. So far, therefore, as they were able to adapt it to their needs, he urged them to utilize their water-gas plant, and thereby reduce the quantity of coal used. He presumed the coal contractors were sufficiently disinterested in this matter, and would not discourage gas engineers—he was sure they would not—in carrying out the little programme he was asking them to adopt.

THE PRINCIPLES OF BLUE WATER-GAS MAKING.

The matter looked very simple; but he would like to enlarge upon it very briefly. He did not know how many of those present had blue water-gas plant. He was afraid a very small proportion. The making, however, of blue water gas was comparatively simple if they knew the right principles of it. Everybody knew how to make carburetted water gas; but in making that they made blue water gas, and only added oil gas. To make the oil gas, the carburettor and superheater were heated-up by combustible gas sent forward with the blast gases. When oil had not to be heated-up and gasified, they did not need the carburettor and superheater raised to a high temperature. They wanted then to limit the combustibles sent forward in the blast gases to the lowest possible amount. To do this, it was necessary to modify the thickness of the bed of fuel, and, if possible, to increase the strength of the blast and to reduce the length of the blow, and this would add to the length of the run proportionately. The idea was to keep down the carbonic oxide sent forward in the blast gases and conserve the energy in the generator. An eye had also to be kept on the carbonic acid content of the gas, which should be kept down to about 6 p ct. In this way blue water gas was produced which had a high flame temperature, had a calorific value of about 300 B Th.U., and they could mix 25 p.ct. of this to the coal gas without injury to the consumers, and with great benefit to their undertakings. He hoped these words would be productive in relieving the railways and in helping the gas companies at a time when both would need every possible assistance that could be given to them.

SUCCESS TO THE GREAT GRIMSBY GAS COMPANY.

Mr. J. H. BREARLEY (Longwood) said he had the pleasure of proposing the last toast on the programme. It was "The Chairman and Directors of the Great Grimsby Gas Company." It was, he remarked, very pleasant to meet on an occasion of this kind in times like the present; and the members of the Association much appreciated the kindness of the Chairman and Directors of the Great Grimsby Gas Company in inviting them to lunch together. Their President would have liked the members to meet in Grimsby; but railway travelling and other matters rendered this absolutely impossible. But the Company were not to be denied the opportunity of showing honour to the President of the Association, and of giving the members the pleasure of their hospitality. The Great Grimsby Gas Company was a very successful one. At the present time, they were supplying gas at no higher price than 2s. 10d., and for power purposes at 2s. 6d. In view of the great difficulties under which the whole industry was labouring, this was very creditable indeed. Their consumption, in common with many other undertakings, had had a slight set-back. But those who knew Great Grimsby best, knew this was quite temporary; and immediately they were out of the war, the town and the Company would continue to flourish and progress as in the past. The progress of the Company would not be less because it had their esteemed President as its official head. The Chairman and Directors were busy men; and this was why he coupled with the toast the name of Mr. Terrace.

The PRESIDENT said, while he appreciated very much the honour that fell to his lot in representing the Chairman and Directors of his Company that day, he desired on their behalf to apologize for their absence. Mr. Brearley hit the nail very well on the head when he said they were all busy men. This time of war had shown them that it was the willing horses that got the work; and it was the men who in normal times were busiest who were giving the greatest service to the country at the present time. Had his Chairman been able to be present, nothing would have given him greater pleasure than to look round the festive board, and to welcome the members on his own behalf and in the name of his co-Directors. They had all the greatest sympathy with Associations of this kind, and believed in the valuable work of this and kindred institutions. He desired in their name to bid the members a hearty welcome. Mr. Brearley mentioned his own feelings on the matter of their visit to Grimsby. They were all very sorry indeed that, owing to circumstances beyond their control, it was quite impossible to ask the Association down to Grimsby at the present time. Had his Chairman been able to attend, he would have taken the opportunity not only of renewing his acquaintance with their esteemed friend (Mr. A. E. Broadberry), but to congratulate him upon being President of the Institution of Gas Engineers, and the Association not only upon having a member at the head of the parent Institution, but on having had him as their immediate Past-President. He thanked them much for the very kind words just used by Mr. Brearley, and so heartily endorsed.

RECRUITING OFFICERS AND UNCERTIFIED UNDERTAKINGS.

Mr. R. G. SHADBOLT (Grantham) asked to be allowed, before Mr Goodenough left, to refer to the remarks with which he had favoured them. He thought it was proper for Mr. Goodenough to have told them what he did following the timely leader that had appeared in the "GAS JOURNAL" this week with respect to the bearing of the word "certified" in the recently-issued Schedule of Protected Occupations. It was quite true that many of them had had no idea that they should become "certified" undertakings, or that it was essential that they should apply for certification. He believed it was in the minds of many gas men that being gas undertakings and in the reserved list that was enough. Following upon this impression was the revelation of the "JOURNAL" leader to which he referred. He ventured to at once put this point, because Mr. Goodenough was in close touch with one of the departments of the Ministry of Munitions. When they wished to communicate with the Ministry, it was difficult to know which department should be approached. It showed the wide-awake spirit of those who controlled the "GAS JOURNAL" that this point in the new schedule should have been taken up so rapidly. And evidently the "JOURNAL" spoke with knowledge and authority. But when their respective local recruiting officers asked them to produce a certificate, and they did not happen to have one, neither the remarks of Mr. Goodenough nor the leader in the "JOURNAL" would satisfy them. Would it not be better, if representations were made to the proper department for a pronouncement to go forth to the recruiting officers and gas undertakings of the country to the effect that such-and-such undertakings and such-and-such kinds of undertakings were those that were intended to be included under the word "certified." This would save a world of trouble, and save some of the time of the gas managers as well, and from what was little less than disaster when in touch with the recruiting officers if official authority could not be produced.

Mr. GOODENOUGH said he should have much pleasure in promising, on behalf of the National Gas Council, that representation should be made to the Labour Department of the Ministry of Munitions on this point—that was, Sir Stephenson Kent's department, which was handling the whole of this new recruiting scheme, whereby there was now a Munitions Area Recruiting Officer and a Munitions Area Dilution Officer, who advised both the Department and the Munitions Area Recruiting Officer. In the case of undertakings recognized by the Ministry the M.A.D.O. must agree to a man being called up before the Munitions Area Recruiting Officer could call him up. The line the Ministry of Munitions took at the present time was that any undertaking that was not certified in the strict sense of the word, but had had badges granted or was connected with munitions work, should send in a return of all their employees from 16 years of age upwards, as asked for by Sir Stephenson Kent's circular. They should forward the circular, with the request to the Ministry of Munitions that they should inform the Munitions Area Dilution Officer that he should deal with the undertaking as a certified one. He was told, when at the Ministry the day previously, that no undertaking that was not certified was entitled to fill in the code number in Column "O" of the return. But where a man appeared to be covered by the schedule if the undertaking in which he was employed was a certified one, the code number could be filled in, not with ink but with pencil, as showing which men it was wished should be recognized and protected. By this means the Ministry would know exactly which men they were asked to deal with, and would give the matter their sympathetic consideration in the case of every undertaking that they regarded as requiring protection. This was as far as he could go at the moment. Sir Stephenson Kent's department was at No. 6, Whitehall Gardens; and there they thoroughly understood the position.*

* We have since heard that the National Gas Council are advised that the course to be pursued by an undertaking seeking protection under the new schedule, but not "certified" at the date of its issue, is:

First—To send in immediately its return of employees on form "M.M. 82s," putting the code number in pencil against the men eligible for protection by occupation (with due regard to age) under the schedule; "T.P." in pencil against men not protected by occupation under the schedule for whom "temporary protection" is sought as being over 32 years of age; and the medical classification in pencil against men not eligible for protection because they were not in their present or similar occupation on Aug. 15, 1915. A covering letter should be sent, formally applying for certificates for the first two classes of men.

Second—To apply immediately for certification by the Ministry of Munitions, giving a full statement of the grounds for application, and especially stating if the undertaking has had badges granted to it for any of its employees.

Third—If any calling-up notices are served upon men for whom protection ("occupational" or "temporary by reason of being over 32") is being sought—to return such notices to the Recruiting Officer who issued them, with a notification that the undertaking is eligible and has applied for certification, so that its men will be dealt with by the "M.A.R.O."; and to notify the Ministry of Munitions Labour Department that an application for certification has been lodged, and that men are being called up who are essential and for whom certificates of protection are being claimed.

Mr. George Helps said he could give a concrete case from Nuneaton. They had their head clerk before the tribunal. First he got two months' exemption, and then six weeks'. They thought they had got to lose him. They, however, wrote to the Secretary of the National Gas Council. He handed their letter on to the proper quarter; and they received one back, signed "Chichester," which stated, in spite of any tribunal, "this man is not to go unless you get a letter under my own hand saying he is to do so." The Company were holding this man until they got the letter.

Mr. Shadbolt said that was not now the point. He suggested that if something could be done by which local recruiting officers could be informed that all undertakings with badged employees were certified ones, this would settle the whole question.

BUSINESS MEETING.

The Business Meeting was held in a neighbouring room—the President (Mr. John Terrace) in the chair.

Minutes of the Last Meeting.

The Hon. Secretary (Mr. F. M. Paternoster, of Felixstowe) read the minutes of the meeting held in September last; and they were duly confirmed.

Death of Mr. W. D. Child.

The President said he had, for the first time that day, heard with very great regret (and this might be the first intimation to some of the members) of the death of Mr. W. D. Child, of Romford. He would ask the members to express their sympathy with Mr. Child's relatives by standing in silence. The Secretary would send a letter in the usual way.

The members expressed their sympathy in the manner suggested.

Letters of Regret.

The Hon. Secretary mentioned that he had received a number of letters of regret from gentlemen who had been invited to be present, but were unable to do so. Among the writers were Sir Robert Hadfield, the President of the Society of British Gas Industries, Mr. F. L. Halford, of the Explosives Supplies Department of the Ministry of Munitions, and the Presidents of other District Associations.

New Members and an Associate.

Mr. F. C. Troughton, of Haverhill, and Mr. C. E. Wright, Works Manager at Ipswich, were elected as members; and Mr. P. G. Wright, of Headingley, Leeds, as an associate.

Annual Report and Accounts.

The annual report and accounts were next submitted. The former reviewed the proceedings of the year, and concluded as follows:

The year commenced with a membership of 131. During the year, five new members were elected, five resigned, and four terminated their connection with the Association under Rule 19. The Committee regret to report the death of three members: Mr. E. Topley, of Tottenham, Mr. J. A. Young, of Louth, and Mr. J. Mason, of Oakham; also one Associate Member, Mr. W. C. Dawson, of Nottingham. The total membership at the end of the year was 123.

The accounts show a balance in the Hon. Treasurer's hands at the end of the year of £20 12s. 7d.; the subscriptions received amounting to £59 17s., and the expenditure to £65 15s. 8d.—the latter figures including a donation of £10 10s. to the Benevolent Fund of the Institution of Gas Engineers. The balance brought forward from the previous year was £26 11s. 3d.

The Commercial Sections have met as usual, and have done much valuable work, and the importance of joining these sections cannot be too strongly impressed upon the members.

Mr. J. H. Troughton (Newmarket) moved the adoption of the report and balance-sheet. He thought that both showed the Association was in a healthy condition.

Mr. H. R. Wimhurst (Bury St. Edmunds) seconded the motion, which was carried unanimously.

The President then delivered the following

INAUGURAL ADDRESS.

We are at war; and everything is so abnormal that I have had great difficulty in deciding on what lines this address should be written. I want to be brief, and intend to resist the tendency of making my Presidential Address a review of the past year. To do so may be somewhat natural under ordinary conditions, and may be interesting and useful in calling the attention of members of the Association to points which they have missed or but faintly noted; but it is a procedure which, in these days, can very well be dispensed with. I therefore propose to confine my remarks chiefly to the relationship between the kindred organizations of the gas industry, believing that after the war, as there will be a general reorganization in most businesses, it will be well for us to consider our present position and future outlook.

Before doing so, however, I desire to thank you for electing me your President; and little as I may feel myself qualified for the position, I regard it as a very great honour, and will try during my term of office to further the interests of the Association in every possible way.

Organization.

The great need for a central organization representing the gas industry has long been felt; and the formation during the past year of the National Gas Council by representatives from the Institution of Gas Engineers, the Society of British Gas Industries, the British Commercial Gas Association, and the Gas Companies' Protection Association is, I feel sure, only the first step towards a more complete co-operative movement for helping forward the work of the industry. I believe there is need for this. It would seem more rational to make use of the machinery of the Associations forming the National Gas Council, with the subsidiary District Associations and their Commercial Sections, together with the Junior Gas Associations, rather than try to devise an entirely new body; and I am of opinion that a good deal more use could be made of our District Associations.

Value of Association Meetings.

I have heard it remarked by gas engineers—and I must confess that at times I have been somewhat inclined to agree with them—that there is not the same necessity now for Gas Association meetings and reading of papers as there was in days gone by, as everything appears so fully and quickly in the Technical Press. That there are advantages in absorbing information quietly and comfortably at home I agree; but every subject cannot be treated in this manner. I submit that the District Associations are now more necessary than ever; but there are many subjects discussed that need not be, and many subjects left alone that should be. At their meetings there is unfortunately usually too much to get through in the time, which engenders a desire to hurry through the papers and curtail the discussions to such an extent that it is not productive of the good it might. In such cases it would almost be as well, as suggested by those who regard District Association meetings as being of little value, for a writer of a paper to hand his MS. over to the Press, and for the contents to be so disseminated to the industry. But the great value of having the views of others on the paper would be quite lost; and I wish to emphasize the need for more earnest endeavours in promoting discussions on papers read, and on our common difficulties and experiences.

I have noted with pleasure the recent correspondence suggesting that the annual meeting of the Institution of Gas Engineers in June should be extended to provide opportunity for full discussion of gas manufacture in war conditions; and though in many ways the parent body, with its gathering of members from all quarters of the country, would seem to be the most suitable place for this, I would suggest that the District Association meetings are in some ways more suitable. They are held more frequently, and many of the members, whose opinions are well worth having, would be willing to speak before the smaller number but would not care to take part in a discussion in the larger assembly. The discussions need not be too formal; and it would be possible to cover very many experiences which at first appear trivial, but are in reality of great importance. The only objection seems to be that—assuming the full discussion were not reported by the Press, which I think would not always be necessary or advantageous—the engineers outside the particular district would not get the advantage. They could, of course, have similar meetings in their own district, and if the programme of an Association of which they were not members was sufficiently attractive, arrange to be present as visitors. Surely no greater distinction could be attained by any Association than for it to receive a large number of requests from those outside its district to be present at its meetings on account of its programme or reputation for having pleasant and profitable discussions.

We have to-day a paper on a most interesting topic. The discussion on it could well cover all the experiences and difficulties encountered in the forced changes in the various processes of manufacture; and I trust the opportunity will be advantageously used, and views and experiences freely expressed. So that these should not be published without the consent of the speakers, I would suggest that proofs of their remarks should in each case be submitted to the various speakers, which could easily and expeditiously be done through the Secretary of the Association; and if it is considered that it is in the best interests of the country that much or all of the discussion should not be published, I am sure the Press will deal with the matter as requested.

Co-operation between Engineering and Secretarial Departments.

I am always comforted by the fact that this Association is somewhat broad in its constitution, and, in addition to engineers and managers, includes directors, auditors, secretaries, and assistant managers. While there may be strong arguments for confining the Institution membership strictly to engineers and managers, there is no reason to exclude the others mentioned from District Associations; and I think that greater advantage might be made of our broad constitution than has hitherto been done. Unfortunately, there appears to have been in the past—or, shall I say, more in the past than in the present—a peculiar jealousy existing between the secretarial and engineering heads of gas undertakings; and as this can neither be good for the undertaking in question nor for the gas profession at large, I think everything possible ought to be done to promote that feeling of co-operation among the executive staff that is so necessary for the efficient carrying on of any business. Many useful discussions could be arranged on matters connected not only with the method of keeping accounts, records, and other books of gas undertakings, but also on questions on general policy, finance, &c. After all, the making and distribution of gas is a business, and should be run as such, with a properly balanced control. It is no use for the engineer to make a fine record of make per ton or some such special point, if by so doing he is allowing waste to occur in other directions.

One has only to study the analyses of gas accounts as published from time to time—and I would here say that I think we are greatly indebted to the Technical Press for the facilities provided

in this direction—to see the numerous and various methods that are adopted by different companies in the control of their affairs. While many of the burdens, such as high capital charges, obsolete plant, &c., must influence the manner of using the profits of the concerns to the best advantage, they do not, I think, account for the great variations found. It is hardly to be expected that all directors of gas companies and the members of gas committees should be experts in gas finance. It may therefore be assumed that the variations in policy are due in great degree to the executive officer; and I submit that there are many engineers who, while they may excel in the construction and working of apparatus for making gas, are not so qualified by nature or training for advising on questions of finance and commercial policy as a good commercial man would be. Nevertheless, there are many good reasons, in medium-sized undertakings at any rate, why the trained engineer should be the commercial manager and adviser. I would suggest that District Gas Associations might do much good work; for if the membership, as in our case, includes directors, auditors, secretaries, and assistant managers, the intercourse and discussion of comparative figures regarding cost of production and distribution, the policy of hiring-out various classes of apparatus, the most suitable method of dealing in the accounts with expenditure, &c., could be used towards this end. Even if the discussion did not convince any member that his was not the best practice, it might very well modify his views; while the assistant managers would obtain a broader view than if they only knew intimately the policy of their own chief.

The practice of accepting the "all-round" result when it happens to be good, is surely not good business. If the result were bad, the various details would be examined most closely; and surely this should be done in any case if proper business efficiency is to be maintained. The great modifications in output due to the war have so affected the standing charges that many unexpected results have been found when the balance sheet came to be made up. The directors of up-to-date general business concerns require to know at least once a month from their manager how they stand in the matter of profit; and while much labour may be wasted in obtaining too great a degree of accuracy, a comparatively small amount of labour, with efficient method, will enable the manager of a gas undertaking to know month by month how he stands. Here, surely, is a matter for co-operation between the secretarial and engineering staff.

WORK OF THE COMMERCIAL SECTIONS.

The Commercial Sections of the various Associations continue to do very good work, and members who attend their meetings know well the great help received through the useful, and often informal, discussions that take place, and which cannot be recorded and passed on to those who are unfortunately unable to be present. We have, therefore, in the District Associations all the machinery that is necessary, not only for providing a member with the information he requires of his own particular district and for furnishing him with opportunities of comparing experiences and difficulties with his neighbours, but, through their being affiliated with the Institution of Gas Engineers, a natural channel for conveying the views of the members, through their representatives, to the Council of the Institution.

I have endeavoured to show how the work of the District Gas Associations may assist and relieve the work of the Institution; and it is very satisfactory to note specially one of the increased duties which the parent body has recently taken upon itself. I refer to the publication of the *brochure* on naphthalene. The time of issue was opportune, and the information concisely given; and those responsible for the idea of issuing it, and for the matter it contains, are to be congratulated. I trust it is only the forerunner of many similar publications.

EDUCATION AND TRAINING OF FUTURE ENGINEERS.

The lengthened absence on War Service of so many of the junior members of gas-works staffs suggests consideration of the question of the education and training most suitable for those who will in the future control the various gas undertakings. The great changes and development of gas supply in the last decade, and the promise of still greater development in the future, make it essential that the gas manager-to-be should be provided with an education on broad lines and suitable for the duties he will be called upon to undertake. While it is desirable that he should spend sufficient time on practical and routine work to make him conversant with details of construction and working of plant, his training should not be too confined. A liberal education in science, especially chemistry and engineering, a good general knowledge of accountancy and commercial methods, and a reasonable practical training, would appear to be a good combination. But he ought to be encouraged to cultivate in himself the power of using these attainments.

This might in a limited degree be accomplished by a Committee of the Institution of Gas Engineers awarding medals and diplomas for theses written on the original investigation on any of the processes of manufacture. The work entailed in the investigation would prove most valuable to the student, and the information might prove useful in suggesting to the Committee suitable subjects for further research. The theses could be filed at the offices of the Institution for inspection by engineers who desired to judge by them the capabilities of students applying for the post of assistant, while the attainment of a medal or diploma would mark out an assistant for preferment in the works where he is employed, or assist him to obtain a higher post. It would be convenient to state on the face of the diploma the examinations, such as Gas Engineering and Gas Supply, which had been passed. It is very gratifying to read the papers and discussions of the Junior Gas Associations, as from the quality of the papers, and the interest evinced in the discussions, one feels that the material for the making of good administrators is there; and any arrangement whereby the attainment of the experience and further knowledge necessary to equip them for the management of our important industry can be helped, is worthy of consideration.

THE BRITISH COMMERCIAL GAS ASSOCIATION.

The B.C.G.A. continues to do its indispensable work, and has proved its ability to spend wisely and effectively whatever contributions are made to it. The recent decision of the Executive to curtail current expenditure on account of the exigencies of the times, and to lay by a portion for a special campaign after the war, is evidence of good sound judgment; and when the war is over, I think the subscribers will mostly feel that they should place more money at the disposal of the Association than they have hitherto done. The present basis of subscription was more or less in the nature of an experiment, to see what could be done. Surely the B.C.G.A. has proved its capabilities to handle a very much increased amount to the great advantage of the industry; and it is regrettable that even 20 per cent. of the undertakings of the country should still be obtaining the benefits of the good work that is being done without taking their part in providing the necessary funds.

While the war has brought many troubles and disadvantages, it has also, I believe, altered many of our ideas with regard to what is necessary and what is not so; and I have heard more than one engineer express the opinion that there were many things we did before the war which we should not do again. Our ideas and viewpoint have been changed, and, I trust, to the advantage of our business. The real business man—and I mean the term in its widest sense—is coming into his own, and methods and policies which have previously obtained will, in many cases, be weighed in the balance and discontinued. It is true that we are public service institutions; but our businesses must be run on sound business lines, and when we see an Association like the B.C.G.A. "making good," as our American cousins say, we should do all we can to forward the work and induce those not already doing so to take their fair share.

THE CALORIFIC STANDARD.

The movement practically forced upon the gas industry to use a calorific standard considerably lower than that previously obtaining, and the temporary abandonment of the candle-power standard, have caused much useful information to be secured; but there appears to be a considerable difference of opinion as to whether the reduction is not in many cases too drastic, and whether the calorific value is of itself a sufficient indication of the value of the gas. Probably a good deal of this is due to the different methods by which the gas has been reduced in calorific value. That the practice of increasing the volume by adding, intentionally or otherwise, inert gases is not in the end in the interests of the supplier is, I think, quite agreed; but there is a difference of opinion expressed by several contributors to the Technical Press as to the efficiency of using gas of considerably decreased calorific value. This is a matter that will, however, right itself in time, as, even if a common parliamentary standard were fixed, each undertaking would no doubt send out the product that it found gave the greatest satisfaction, irrespective of the statutory obligation. In writing this I have in mind the great variation in the candle-power of the gas as stated by different concerns, although in this connection there is, perhaps, not such a great variation in the quality of the gas as in the stated candle power. This appears to me to be the only explanation of the great discrepancy in the comparison of figures given for the candle power and calorific value of the one gas when compared with another.

GAS FOR RUNNING VEHICLES.

The use of gas in place of petrol for commercial vehicles, buses, &c., does not appear to progress very rapidly. The members will, no doubt, be interested to learn that the Grimsby Tramway Company are running one of their buses regularly on coal gas, using a large bag on the roof of the bus in the manner originally adopted at Nottingham. The bag contains about 500 c.ft. of gas, and the connections are such that should the gas supply at any time prove insufficient, petrol can be immediately turned on to the engine. They are so satisfied with the result that they are having two other buses equipped. This system is only suitable for short journeys; but as the majority of motor bus routes are not long, there appears to be a good field for extension.

At the close of the Address,

Mr. A. E. Broadberry (Tottenham) said it was his privilege and pleasure to propose a hearty vote of thanks to Mr. Terrace for the address he had delivered. The members would agree with him when he said it was very interesting; and its one fault was that it was far too short. They were beginning to feel they were enjoying a great treat when they found that the President was getting towards the end. They felt they would have liked him to have gone on for about another half-hour making his interesting suggestions. The matter contained in the address was well worth pondering over; and for the address alone, the members were well rewarded for the journey made to London. So far as he was personally concerned, he found it contained a great many suggestions as to the possibility of improving the work of the

Institution; and for this reason he was much indebted to Mr. Terrace. Before long he would have to be preparing an address for the Institution; and he fully appreciated the difficulty Mr. Terrace must have had in writing a suitable address in view of the kaleidoscopic alterations and transitions of the past year. From day to day, conditions were changing very rapidly; and what one wrote to-day might be out of date to-morrow. For instance, the information they had had given to them after luncheon, if it had been placed before them a week or two ago, he had no doubt would have induced Mr. Terrace to impress strongly upon the members of the Association the very great need there would be in future for limiting the quantity of coal used as much as possible in the national interest, and for making as much water gas as they reasonably could—he dare not say carburetted water gas because of the difficulty ahead in obtaining the oil necessary. But there was the possibility of using a large proportion of blue water gas, and so assisting to carry on the national work of gas supply with a reduced quantity of coal. That they must face a reduced quantity he thought Mr. Glover had made perfectly clear. He was sure the gas industry in the Eastern Counties would do its utmost to help the Government through the difficult time ahead. While thanking Mr. Terrace for his address, he wished him and the Association under his presidency continued prosperity.

Mr. R. G. Shadbolt, in seconding, said that one thing that particularly struck him during the reading of the address was that, while they had various organizations composed of men who were struggling to discharge their duty, they were, he thought, from time to time subjected to a great deal of unnecessary criticism; and it occurred to one at times whether the ordinary rank and file of the members really made the best use of their opportunities in connection with these organizations. The address showed the President to be fully alive to the requirements of the times; and he had some amount of imagination which carried them beyond the present. If they were guided by his indications and suggestions, they would find, after the calamitous war was over, that as an industry they had been adapting themselves during the progress of the war, and, while they had justice on their side in claiming that they were rendering an important service to the country before, that the service had increased during the war, and from it they would be able to judge of the service they could in future render.

The motion was heartily passed.

The President thanked the members for the kind manner in which the vote had been carried. If he had in any way been able to make a good impression on the members by what he had said, he was amply rewarded for any trouble to which he had gone. In his own way, he had had to do the best he could. It was his best; and he believed the members were satisfied.

Benzol Recovery by a Modified Dehydrating Plant.

This was the title of a paper contributed by Mr. E. F. Keable, of Gorleston. It gave rise to considerable discussion. Both paper and discussion will be dealt with in next week s issue.

Supply of Plant and Machinery—A Question for the National Gas Council.

Mr. W. W. Townsend (Colchester) was called upon by the President to propose the resolution of which he had given notice. It was as follows:

> That this meeting requests the National Gas Council to take immediate steps to bring to the notice of the Ministry of Munitions the difficulties experienced by the members in obtaining necessary plant and machinery, and submits that, in view of the important work being performed by the gas industry, priority should be given for plant which is shown to be urgently needed for carrying on the business.

He said he was at a great disadvantage in proposing the resolution, because, without having heard any arguments in support of it, one of the members of the National Gas Council had made certain adverse comments on it. Still he (Mr. Townsend) adhered to his opinion. He thought the members of the industry had during the difficult circumstances of the last few years relied far too much on their own initiative. They had been ploughing their lonely furrows, and had met with snags and other obstacles. He thought they might have done a great deal more than they had through their various organizations; and had they united themselves over a great many questions, instead of each one pursuing an individual course, it would, he was sure, have been to the good of the gas industry generally. At the present time, they were doing all they individually could to get hold of necessary materials. What he was suggesting was that they should make use of the Association and the National Gas Council, to show the Government and the Priority Committee that certain things were essential to the gas industry—they should in fact back each other up. It was said this was a very vague resolution. Well then he had a practical suggestion to make; and it was that the National Gas Council should represent to the Priority Committee that a Committee of Gas Engineers should be formed, and that all the applications from the gas industry should go through the Committee, to see what things could be cut down, or whether the material asked for should be granted. If they could pass through this ordeal, and the Committee of gas experts said this was a thing that should be done, then he submitted that the Priority Committee ought to take notice of such a recommendation. He was not suggesting that copper should be used for making geysers; he did not think it was necessary when copper was not available that they should go in for geysers. It was a far different matter with many of them. Men were being taken away; but labour-saving machinery could not be got. This was the case, he knew, in more than one instance. All sorts of problems arose through shortness of coal and shortness of works; and each problem should be considered individually. He had a proposal now for putting down a railway siding that would save the labour of eight men and eight horses. The siding would cost very little; it was only a matter of laying about 100 yards of siding. But he could not put it in hand. Then priority could not be given for a weighbridge; and he thought a Committee who knew all the details would vote that this should be done. It would save over the next twelve months the labour of six men and horses doing really unnecessary work, if it could be dealt with according to his plan. He should not have the least hesitation in the world to go before a body constituted as he had suggested, and lay his proposal before them. He thought the whole industry ought to be in the position of being able to put forward properly its requirements where there would be a certain advantage. He submitted that the resolution should be sent to the National Gas Council, with the view to their taking steps to ascertain if the industry's requirements could not be dealt with on some such basis as he suggested.

The President remarked that Mr. Townsend was placed in a somewhat peculiar position on account of the remarks that were made before he had an opportunity of putting the resolution before the meeting. There was, however, no reason why they should drop the resolution; and if someone would second it, he would be pleased to put it to the meeting.

Mr. E. W. Smith (Chelmsford), in seconding, thought the thanks of the members were due to Mr. Townsend for having brought the matter forward, for there must be many gas undertakings not only in the Eastern Counties, but throughout the country, who had suffered considerable inconvenience and no little expense owing to the delay and difficulties in obtaining materials, machinery, and plant for extensions, which in many cases had been rendered necessary owing to the increase in the output of gas. He himself had suffered, as no doubt many others had done, from the same cause. Early in July, 1915, his Company placed an order with a firm of contractors for a new gasholder. It was hoped the holder would be ready for use the following winter. But it was a vain hope, because the Ministry of Munitions laid an embargo on the steel work required for its construction. Eventually, although representations had been made as to the urgency of the work, they withdrew the sanction which had been given for the delivery of the materials to the contractors. When he mentioned that in December, 1914, they had storage capacity equal to 60 p.ct. of the maximum output, and that in the Christmas weeks of that year the output rose by upwards of 40 p.ct., he thought there were strong grounds there for the Priority Committee authorizing the delivery of the materials. The original consent was, he might here say, given but tardily, the material was stopped, and the work was hung up for months. He despaired even now of the holder being ready next winter. He well remembered early in 1915 attending a meeting called by the High Explosives Supplies Department, at which Mr. Charles Carpenter laid before those present the gravity of the then situation with regard to high explosives. He appealed most strongly to all present on that occasion to use their best endeavours to get installed plant for producing as much benzol and toluol as possible for the use of the Government. They went away from the meeting feeling deeply impressed, and many of them at once began to take steps for stripping their gas of benzol and toluol, because of its importance for the conduct of the war. His idea was that the Priority Committee should give special consideration, and if necessary preference, to those industries engaged on vitally important war work. The reason why he could not get steelwork for his holder was that the Ministry of Munitions had commandeered it. They were told it was required for munition, shell, and other factories. But he maintained that gas-works should receive equal treatment. A warship would be a useless hulk without engines, the guns would be useless without shells, and the shells would be useless without high explosives for filling them. The Priority Committee had missed its way in not giving consideration to gas undertakings which were providing these vitally important constituents for high explosives making. He noticed not long ago an Advisory Committee had been appointed by the Priority Committee; and the name of Mr. Henry Woodall was among the members. In this, there was hope that a better state of things would result. He thought that they should pass the resolution in such a manner as would strengthen the hands of the National Gas Council and enable them to put the matter before the Priority Committee, with the view to securing better treatment.

Another Speaker pointed out that the bye-product coking concerns wanting steelwork in connection with extensions could on application get a certificate by the following post. He thought that gas undertakings, who were also supplying benzol and toluol, should receive the same consideration.

Mr. Townsend stated that the firm who took his order for a weighbridge told him of an instance where in another factory two were put in. Why should one place have two weighbridges, and another place not be able to get one at all?

Mr. A. E. Broadberry said he would like to point out, as a member of the National Gas Council, that the resolution would do very little good. After all, it was merely a general resolution. It could not be expected that the National Gas Council or anybody else was going to get a general order made that the Priority Department were to issue permits for the gas industry without making individual inquiry into the absolute need of the particular piece of apparatus. Each one of them was having to suffer a great deal of inconvenience due to the war. No war could, in fact, be carried on without inconvenience. But it was going too far to expect that the National Gas Council were going to move a Government Department to pass some general instruction that, merely because a priority permit was asked for by some maybe quite a small unit of the gas industry, a priority certificate should be issued straightway without any inquiry into it. If there was to be an inquiry, then it appeared to him it came down to individual information such as it seemed Mr. Townsend and Mr. Smith had already given to the department; and when the department had considered the individual demand, and the whole circumstances surrounding it, they would still come to their own conclusion as to whether it was really essential for the national needs that the permit should be issued. Therefore he did not consider the resolution, if it went up to the National Council, would do any good. But if the Association passed the resolution, and it went forward, he would do what he could to place the views of the members before the Council when it was being discussed. He would make the same representations to the Council that the members had made that afternoon.

Mr. Thomas Glover (Edmonton) having spoken,

Mr. J. H. Troughton (Newmarket) remarked that he should not like it to go forth that the gas industry was in any way at all unpatriotic. The first business of the Government and the Ministry of Munitions was to win the war. But for the resolution to go out in its present form, he considered would be one-sided. At the same time,

he did not propose to vote against the motion, because he himself had suffered inconvenience from being unable to get goods. Several speakers had referred to the fact that the gas industry was doing a good deal in supplying materials for the war: but he should not like it to go out that they were asking for a *quid pro quo*.

The motion was unanimously agreed to.

Reverting to One Vice-President.

The President moved a resolution deleting from Rule 6 the words "Senior Vice-President" and "Junior Vice-President," and substituting "Vice-President" only. A similar amendment was proposed in Rule 7. He said that two years ago the rules were altered to include a second Vice-President; and now the proposal was that the rules should be altered back again. It was found a disadvantage to have two Vice-Presidents.

Mr. H. R. Wimhurst seconded the motion, which was carried.

Election of Office-Bearers.

On the proposition of the President, seconded by Mr. J. H. Troughton, Mr. J. H. Brearley, of Longwood, was elected President for next year.

The President announced that Mr. H. R. Wimhurst automatically became Vice-President.

Moved by Mr. Troughton, and seconded by Mr. Wimhurst, Mr. E. W. Smith was elected a member of the Committee; and proposed by Mr. E. F. Keable, seconded by Mr. W. W. Townsend, Mr. H. G. Ruggles was also elected a member of the Committee.

On the proposition of Mr. R. Wardell (Tottenham), seconded by Mr. A. W. Sumner (Grays), the Auditors Mr. W. Beale (Royston) and Mr. W. Brown (Brandon) were re-appointed.

Proposed by Mr. Brearley, and seconded by Mr. H. R. Wimhurst, the Hon. Secretary, Mr. F. M. Paternoster was re-elected—some complimentary speeches being made about his work, and the manner in which it is performed.

Place of Next Meeting.

Mr. Brearley (the President-elect) said much as he should have liked to at once invite the members to visit Longwood for the next meeting, in present circumstances it was quite out of the question. If the war ended before his presidency expired, he presumed the old order of things would be reverted to. Therefore, until the Committee had time to deliberate over the question, he would suggest that the date and place of meeting should on this occasion be left in the hands of the Committee.

Votes of Thanks.

On the motion of Mr. C. S. Shapley (Southend), seconded by Mr. C. G. Grimwood (Sudbury), a hearty vote of thanks was passed to the whole of the office-bearers—special reference again being made to the work of Mr. Paternoster.

Price and Guaranty of Gas-Meters.

The President said a letter had been received from Mr. Troughton; and he would ask him to introduce the subject of it to the members, and to move a resolution.

Mr. J. H. Troughton stated that at a recent meeting of the Eastern Commercial Section, he was requested to write to the Secretary of the Association, asking him to make representations to the National Gas Council regarding the question of price and number of years' guaranty of gas-meters. The Council should consider the question as to whether pressure could not be brought to bear upon the manufacturers of gas-meters to induce them to adhere to the old principle of five years' guaranty of the life of meters, which had been reduced recently (probably on the ground of the war and the cost of materials), from five to two years. This was a big reduction in the period; and, with the life of meters only guaranteed for two years, it gave the meter makers—at all events this was the opinion of some gas engineers—considerable latitude in sending out a more or less inferior article. He proposed that the Secretary write to the National Gas Council, drawing their attention to the matter, and asking them to take steps to try to get an adherence to the five years' guaranty.

Mr. J. H. Brearley said they did not want to send the National Gas Council too many "instructions." What they could do was to write and ask them whether something could not be done to get the meter makers to alter their decision. If they did this, the Council would probably inquire into the price of meters and the question of the reduced guaranty. The meter makers might have a reason for altering the period to two years during the war; and probably they might get back to the five years after the war. If the resolution was altered to this effect, he would second it.

Mr. Troughton said that was really what he intended. If he had made his intention appear stronger, he was sorry.

The motion was unanimously carried.

This concluded the proceedings.

NORTH OF ENGLAND GAS MANAGERS' ASSOCIATION.

Meeting at Newcastle-on-Tyne.

The annual meeting of the North of England Gas Managers' Association was held last Saturday afternoon, at the offices of the Newcastle Gas Company—Mr. William Hardie (the Acting President) in the chair.

Letters of Regret.

Letters of regret for non-attendance were read from, among others, Mr. W. N. Westlake, the President of the Southern Association of Gas Engineers and Managers, Mr. John Terrace, the President of the Eastern Counties Association, Mr. A. E. Broadberry, the President of the Institution of Gas Engineers, and Mr. W. Doig Gibb.

Annual Accounts.

The Hon. Secretary (Mr. Herbert Lees) presented the statement of accounts.

The President, in moving its adoption, said he thought they would all agree that their financial position was fairly good. It had been a difficult year, but he was pleased to say they had a fair balance at the bank, which, he considered, was satisfactory.

The accounts were passed.

Membership.

Mr. Thomas Thompson Tarn, of Darlington, was elected an associate member of the Association.

The Hon. Secretary remarked that the new member list contained only one name, and that new members were required. As a result of the abnormal conditions, the membership was down a little; but he hoped it would be quickly strengthened. When new men came into the district, he trusted that the members would give attention to them with a view to the new comers joining the Association.

Donation to the Institution Benevolent Fund.

The President, in moving the adoption of a recommendation of the Committee—"That a donation of £10 10s. be contributed to the Benevolent Fund of the Institution of Gas Engineers"—said that he was very glad the Association were in a position to give this contribution.

Mr. J. Whyte (Seaham Harbour) seconded the motion, and it was agreed to.

Papers Read.

Two papers were read—one by Mr. H. E. Bloor, B.Sc., B.Eng., of York, on "Some War-Time Alterations of Works" (which is held over until next week), and the other by Mr. T. M. Waller, of Durham City, on "Organization in the Gas Industry."

Mr. Waller's paper was as follows:

ORGANIZATION OF THE GAS INDUSTRY.

It is hardly necessary for me to say that it is most important that every industry should be well organized if the greatest success is to be achieved and maintained; and I think it will be agreed that the industry with which we are connected has suffered through lack of proper organization in the past. The formation of the National Gas Council is undoubtedly a step in the right direction, inasmuch as united action can be taken on behalf of the Associations of which it is composed. But it still leaves much to be desired, because it cannot truly be described as representative of the industry. An important industry such as ours should have an Association to represent all who are interested in it; and I think it should be open to include in its membership directors, officials, and foremen of gas undertakings; manufacturers of gas plant and appliances; and companies owning coke-oven plants. There are others also who might with advantage be included. In my opinion, what should be aimed at is to have an Association that will attract all, including those who at present remain outside the existing Associations, so as to get as large a membership as possible. The greater the number of members and the more representative of all the interests concerned, the greater will be the power of such an Association. "Many men, many minds, are necessary for a progressive civilization;" and they are equally necessary for a progressive industry.

The State and Research Work.

If we had a powerful organization, we could impress upon the Government with more force the very great necessity that exists in this country for research work on a large scale being undertaken by the State—not only for the benefit of the gas industry, but of all industries. This work, which has been very much neglected in the past, must receive the greatest possible attention in the future, if our Empire is to maintain its position in the world. It is an unpleasant fact that for many years past British industries have not developed at the same rate as those of most foreign powers. As a consequence, we have been gradually losing the leading position we held in the markets of the world, and, what is more serious, our manufacturers and others have had to depend upon foreigners for supplies of a great number of important commodities. Many things of foreign manufacture have been used in our industry, for the sufficient reason that we benefited both in quality and price. With good organization and systematic research work in this country, such an unfortunate condition of affairs would soon be altered.

Independent of anything the State may be induced to do, and of what is being done by most large undertakings, I think we should have experts for research work in connection with a National Gas Association. At present there are in connection with this industry, in addition to the District Associations, the British Commercial Gas Association, the Coke-Oven Managers'

Association, the Gas Companies' Protection Association, the Institution of Gas Engineers, the Society of British Gas Industries, and the Sulphate of Ammonia Association. An amalgamation of these Associations in the near future is not to be counted upon, because, though there have been many individuals who have for years tried to prevail on some of the Associations to join hands, still the opposition always proved to be too strong. However, supposing it was agreed to amalgamate. I submit that, though the industry would then be united, it would still not be represented as it should be, unless the new body was worked upon new lines. Therefore, it may perhaps be best if the Associations named remain as at present. Each has its particular work, the details of which may receive better attention than would be the case if there was only one body.

A National Gas Association Proposition.

Seeing that a properly-worked National Gas Association would protect all interests, on one being formed the work of the Gas Companies' Protection Association would be gone. May I therefore suggest to the Committee of that Association that they might be the nucleus of a National Association? It would not incur much trouble or expense for them to circularize engineers, managers, and secretaries to ascertain those who would be willing to join such an Association, and asking also for the names of other employees in the same concern suitable for membership. If this was done, and the appeal met with sufficient support—such as I hope would be forthcoming—the thing then would be for the Association mentioned to be reconstituted so as to allow it to bring about the change as quickly as possible. Should the Gas Companies' Protection Association be unwilling to do as I suggest, I think all existing Associations might call a special meeting to discuss the matter, as it is of the utmost importance that something should be done—and the sooner the better.

I would suggest that a National Gas Association should be formed and worked somewhat on the following lines: There should only be one designation of members, and they should be classified in sections; but a member qualified for more than one section would choose which section he wished to be under. By such an arrangement it would be easier to arrive at the number to constitute the Executive Council, which should be representative of each section in proportion to the number of members in the section and to the total membership of the Association.

The sections might be arranged as follows:

a. Directors and committeemen of gas undertakings.
b. Engineers and managers and their assistants.
c. Secretaries and their assistants.
d. Gas plant and apparatus manufacturers and their assistants.
e. Representatives of allied businesses.

The members should first be grouped in branches, and each branch would have its President, Committee, Secretary, and Treasurer. General meetings should be held monthly, and before each meeting the members should receive a copy of the *agenda*. It would be advisable for general meetings to be held during the afternoon, and the committee meetings during the evening of the same day, when a report should be drawn up to forward to the Executive Council, with the resolutions passed at the general meetings.

The permanent officials at headquarters and the Executive Council would consider the resolutions passed at the different branches, and, in return, would submit propositions based on them, together with their views, and any other matters of importance, to each branch for consideration at their next meeting. In this way the Council would be in constant touch with all the members, which I think is greatly to be desired, and they would then have the considered judgment of the members to help them regarding any matters submitted. There should be yearly or half-yearly conferences—preferably the latter—each branch sending one or more delegates, according to the number of members. The delegates would discuss and vote upon the resolutions submitted, and elect the Executive Council, Parliamentary Committee, and other Committees. The number of permanent officials, and other details, I need not enter upon, because such matters can easily be arranged.

Imposing Headquarters in London.

I think that the headquarters of the Association should be in London, and should be an imposing building, worthy of the industry, and one to be proud of. We might take a leaf out of the American's book—if I may so put it—with advantage. Their large business firms found it pay to erect palatial buildings for their headquarters in the chief cities; and I consider it a pity we should be behind in this respect. In addition to committee rooms, offices, and laboratories, there should be a grand meeting hall fitted with the most effective means of lighting, heating, and ventilating by gas, so that we could show in an unmistakable manner the superiority of gas for such purposes. There should also be show-rooms, where the best samples of different gas appliances could be seen in working order, and, as an additional attraction of educational value, I think working models of apparatus used in the manufacture and distribution of gas should be added, which would, I am convinced, well repay the expense incurred. In short, the gas building, whatever its name, should be one of the attractions of London—a place to be sought after, and talked about by visitors.

I feel sure that a ready response would be made by directorates, committees, officials, and others, to an appeal for a substantial building fund for the purpose of housing the Association in a suitable manner. I would suggest that the annual subscription of members should not exceed 10s. 6d. each, to be payable to the branch treasurer, and that each branch pay half the amount received to headquarters for expenses of management. Many may consider the amount named too small; but the usefulness of an association cannot be measured by the size of its subscription. In my opinion, a large number of small subscribers are preferable to a small number of large ones. Most Associations depend on the energy of the few, and as a rule the energetic ones are very few in proportion to the number of members. Therefore a large membership is essential.

Had our industry been properly organized, we might have been able to prevent some of the Government restrictions that are now hampering us, and also have prevented the manufacture of colours slipping out of the country, and the erection of coke-ovens by Germans. We could have erected the latter just as well—indeed, there is nothing that foreigners do for us that could not be equalled by men in this country. I shall not refer further to what might have been done in the past, nor yet to any of the many matters which are awaiting our consideration. There have been complaints in the Technical Press that the National Gas Council did not take the initiative in certain matters, and exception taken to some things they have done; but I think we cannot expect affairs to be better looked after until there is a National Association with a permanent staff that will devote themselves entirely to the work, and who will be assisted in their work in the way already suggested.

It is desirable that there should be more discussion regarding the working and development of our industry than we have had at the ordinary meetings of the different Associations. To discuss the papers submitted is not sufficient. Greater benefit would be derived if a portion of the time at disposal was occupied by members discussing general subjects or points in regard to working which may be of special interest or importance at the time. If this was done we should probably induce many to give their experiences who, under present conditions, refrain from doing so. Had there been no Association in existence it would have been easier to form one; but having several makes it somewhat difficult. Still, if only the attempt is made, with the object of benefiting the industry as a whole, I have no doubt of a successful result.

I feel sure there is a very great future for our industry, and that the achievements of the past will prove small in comparison with the developments that will take place in the near future. But we must be united and try to improve our organization, and promptly consider and discuss every new idea; so as not only to keep abreast of the times, but ahead of them.

DISCUSSION.

The President, in opening the discussion, said no word had been more in evidence since the war began than the word "organization." Organization was supposed to have given the Germans the ability to win in the first stage of the war, and organization, there was no doubt, was going to give us the opportunity to win in the last stages of the war. They were indeed finding that organization was the one and only cure for all the troubles by which the various industries were beset. There would be some diversity of opinion upon some of the things said by Mr. Waller. For instance, the speaker would not like, just right off, to accept all the paragraphs in the paper that the gas industry had suffered very severely in the past through lack of organization. As a matter of fact, in the last score of years the gas industry had made enormous progress, and made largely on account of its organization—its engineering and commercial organizations. Certainly recently there had been the enormous advantage that had accrued to the Associations and the gas industry generally from its Commercial Sections, one of which was connected with the North of England Association. Of all the meetings he attended in connection with the engineering, commercial, and other sections connected with the gas industry, he found none more helpful to himself, and none more profitable to the Company with which he was connected, than the Special Purposes Section which met regularly under the auspices of the North of England Gas Managers' Association.

Mr. S. Shadbolt (South Bank) congratulated Mr. Waller on his courage in setting forth his point of view. The general tone of the paper—and he wished to put it as mildly as he could—suggested to the speaker that, at any rate, it showed a lack of appreciation of existing organizations on the part of the writer. Let them glance through and see the names of the Associations that were already in existence—from the Commercial Associations attached to, and working with, the District Associations, right through to the Institution of Gas Engineers, and linking-up with the gas industries was the British Commercial Gas Association and so on to the newly-formed National Gas Council—and he did not think, in view of these organizations and their linking-up one with another, that anyone could fairly and squarely get up and plead for a re-shuffle of the whole pack. They should beware of over-organization. He thought they were asking for too much in Mr. Waller's paper. The organization bogey, like charity, must begin at home, and not in London. Let them look at the sections which came within Mr. Waller's vision. In the first place, the author suggested that the directors and committeemen of gas undertakings might be put into a section. Well, already there was provision for these in the Commercial Section. Next, the engineers, managers, and their assistants were to be grouped together. What about the Gas Institution for these? They could not go down to foremen and fitters. Thirdly, the secretaries and their assistants were to be a section; whereas the Special Commercial Sections already brought these officials together. He did not wish to be too drastic in his criticism; but he thought they

had already very excellent organization in connection with the gas industry.

Mr. E. P. RIDLEY (Newcastle) said he could not agree with most of the author's paper. He thought Mr. Waller's scheme impracticable. It was too wide in its application, and proposed to divide all of them into water-tight compartments; and, from the financial point of view, he did not see how it was going to pan-out at all. There were 800 statutory gas undertakings in the country; and assuming they obtained an average of five members from each, that would give them 4000. If they had a subscription of (say) 10s. per annum from each member, that would give them £2000 to go to headquarters. Half of this sum would be just about the salary they would have to pay to a good secretary. And then, what was to become of all the other permanent officials, the up-keep of research work, and the maintenance of the palatial building proposed? What was wanted was something that would not be nearly so wide, and yet would, at the same time, bring in a more comprehensive representation on the National Gas Council in regard to certain portions which were left out at the moment.

Mr. H. E. BLOOR (York) claimed that they had already a most marvellous organization. It was meeting practically all the needs of the industry. They were not, of course, organized to meet all the special needs of the war; but in this respect they were like other industries. It seemed to him that what was required was to stimulate and make more progressive the existing bodies. Some of them had room for such stimulation. When they had all been linked together, they would be able, when some great question arose, to speak with a united voice—the united voice of the gas industry. The thing the speaker came nearest to approving in Mr. Waller's paper was in regard to the house of the gas authority, whatever it might be, in London. He thought their existing premises in London were rather a disgrace to the industry. He always felt that they were more than inconvenient. There should be rooms for all purposes—rooms for private use such as study, library, &c., that members could go to as they would to a club. He thought something of this kind could be provided, and on a more moderate scale than was proposed by Mr. Waller. If they aimed too high, they would likely get nothing except interminable delays. Mr. Bloor suggested that a man was not in a position to criticize existing organizations properly unless he had used these organizations, and had done his best to help the Associations and to give the best service to the members. He would ask Mr. Waller to justify himself in the first place by adding the value of his knowledge to the common stock at the monthly meetings of their Special Purposes Section.

Mr. A. C. HOVEY (Sheffield) said the Gas Institution had been in various buildings; and he would not be surprised if, one of these times, they asked the Institution of Electrical Engineers to let them in there.

Mr. HERBERT LEES (Hexham) said there were more important things than buildings. Something had been said about the necessity of officials; and he remarked that the secretaries of the chief gas organizations were very able men and that in every department of their work they were, as far as he knew, very well served indeed. He thought that Mr. Waller when he wrote his paper had not sufficient knowledge of the inner working of some of their organizations, and especially of the Special Purposes Section in the North of England.

Mr. WALLER, in replying to the discussion, said he was pleased with the criticism of his paper. In spite of all that had been said to the contrary, he still believed a great deal of benefit would accrue to the industry if there was one Association. The existing Associations had done very valuable work, and probably it would be better for them to remain as at present; but still he thought they could not say truthfully that the present conditions of affairs represented the industry as a whole as it should be. The different organizations at present sent so many members to the National Council; but he thought it would be better if they could get the industry to pull together. This was his idea. He pointed out that some directors of gas companies would not pay the subscription and expenses of their officials attending Special Sections. The sections he drafted was with the idea of getting in as many of the small men as possible. He was glad his paper had provoked discussion, even if it had taken a little bit of the personal turn because of his not being a member of the Association's Special Purposes Section.

VOTE OF THANKS TO THE AUTHORS OF PAPERS.

On the proposal of Mr. J. WHYTE, seconded by Mr. H. TOBEY, hearty votes of thanks were accorded to the readers of the papers.

OFFICE BEARERS.

The Scrutineers' report on the election of officers was read as follows:

President: Mr. R. Nelson, East Hull.
Vice-President: Mr. Norman S. Cox.
Committee: Mr. T. M. Waller and Mr. A. S. Bagshaw.
Hon. Secretary and Treasurer: Mr. Herbert Lees.
Honorary Auditor: Mr. W. Garbutt.

PLACE OF NEXT MEETING.

Mr. NELSON returned thanks for his election as President, and extended a cordial invitation to the Association to hold their next meeting at Hull.

The PRESIDENT said this was a matter which would have to be decided later on.

A vote of thanks to the President, the Committee, and the Hon. Secretary brought the meeting to a close.

QUALITY OF GAS AND ATMOSPHERIC BURNERS.

The United States Bureau of Standards has furnished a report to the City of Chicago on a series of tests intended to determine the relative thermal usefulness of gases of various calorific values when used on the hotplate of a gas-cooker, or in similar burners for industrial purposes. They have examined the effect of supply pressure, size of gas orifice, size and style of burners, size, shape, and material of utensils, hourly consumption of gas, adjustment of the air-shutter, distance between the bottom of the vessel and the top of the flame, and the composition and calorific value of the gases. Hotplates and grids of standard type were used, with kettles of the kind commonly employed, and weighed quantities of water heated from 80° to 200°—any loss by evaporation being also determined.

The majority of the tests were made with 8 lbs. of water in an aluminium kettle (largest diameter 11¼ in), or with 3 lbs. of water in an aluminium pan 7½ in. diameter. A thermometer was suspended a little distance on one side of the centre, at which point it was found to indicate an average temperature, with the bulb ½ in. clear of the bottom. An adjustable support admitted of any desired distance between the top of the burner and the bottom of the vessel. The efficiency was determined by dividing the total heat absorbed by the water, *plus* that taken up by the vessel, by the total heat liberated by the combustion of the gas. In most domestic cooking operations a portion of the heat liberated by the gas is absorbed by the utensil, passed on to the contained liquid, thus finally reaching the article to be cooked; or, in frying, the food may take the heat by direct contact with the interior surface of the pan. The main thing is the absorption of heat by the utensil, as the contents are indifferent to the exterior source of heat, provided it supplies the temperature and quantity required. This important stage is best indicated by observing the temperature of water in continuous contact with the interior surface. In all cooking operations there are two stages—the food must first be brought to the cooking temperature, and then kept up to this point until the operation is complete. Although the tests cover the first stage only, they give some indication of the same relative results that would follow in the second stage.

The short, condensed, hard, and snappy flame, produced by ample admixture of air with the gas, gives the highest efficiency if the pan is close to it, but rapidly falls as the distance is increased. For small and medium rates of consumption, the longer softer flame, containing less air than is enough to entirely destroy the luminous tip, brings the maximum zone of combustion nearer the pan, and tends to higher efficiency. With proper adjustment in each case, the flame characteristics are not affected by even wide variations in the composition and heating value per cubic foot of the gas. Carburetted water gas has a shorter flame, and the utensils may be closer to the burner, with some slight advantage in efficiency. The official tests indicate the same useful effect from 1000 B.Th.U. whether supplied by 550 B.Th.U. carburetted water gas, 650 B.Th.U. mixed gas, or 715 B.Th.U. specially enriched gas. As it may be assumed that the adjustments would be equally well made for each quality of gas, all varieties of commercial gas should be equally efficient per B.Th.U. for hotplate cooking; but coal gas is at a slight disadvantage, because a larger amount of heat is carried away by the products of combustion. This may also be taken as applying to water heaters.

In gas-oven cooking, also, a given temperature must first be attained and then maintained; and for the same temperature a proportionally lower rate of burning with rich gas would be as good as a higher rate with lean gas. The tests were therefore directed to determine whether a given temperature could be reached with fewer B.Th.U. as set free by one quality of gas rather than another. Common types of range oven, with long perforated pipe burners, and of portable oven set over one of the hotplate burners, were used. Several qualities of gas were burned at varying rates, and the maximum temperature, which ranged from 212° to 600°, was indicated by a thermometer adjusted with the bulb near the middle of the oven, out of the direct line of radiation.

The tests conclusively showed that the quality of the gas does not affect the B.Th.U. consumed, apart from the slight advantage possessed by carburetted water gas over coal gas. The relative usefulness of gas for this type of service will be proportionate to its heating value; and the proposed new standard in Chicago will be 15 p.ct. less useful than the present supply.

SCOTTISH JUNIOR GAS ASSOCIATION.

(WESTERN DISTRICT).

The Annual General Meeting of the Association was held in Rombach's Tea Rooms, Glasgow, on the 28th ult. The election of office bearers for next session, which was the main business of the meeting, resulted in Mr. David T. Marwick, of the Dawsholm Gas-Works, Glasgow, being elected Vice-President; Mr. A. Wright, of Lockerbie, last year's Vice-President, becoming automatically President. Mr. Malcolm Littlejohn, of the Lighting Department, Glasgow, was again elected Hon. Secretary.

There were five vacancies in the Council. Mr. W. Bennett, of Greenock, Mr. A. Stewart, of Airdrie, and Mr. John Taylor, of Glasgow, were re-elected, together with Mr. W. A. White, of Glasgow, and Mr. A. M'Donald, of Tradeston, in place of Mr. Marwick and Mr. J. S. M'Nicol—the latter not being eligible for re-election.

The Secretary's report showed a slight falling-off in numbers; there being ten resignations, as against seven new members. The finances, however, were in a healthier condition than last year, as there was a larger balance in hand.

The President, in closing the meeting, said the session had been carried on under great difficulties, and they were much indebted to the members who had contributed papers.

After the business of the evening was over, the members and friends had tea, and enjoyed the rest of the time in a quiet and sociable manner, with song, recitation, and violin music.

ECONOMY IN COOKING BY GAS.

The searching investigations as to waste in consumption of food and fuel that are a matter of public necessity, elicit the fact that gas consumed in the cooking stove has shared the extravagance that is a general feature in English homes; and a paper read by Mr. W. C. Buttner, of the Peoples Gas Light and Coke Company, Chicago, before the Illinois Gas Association, is appropriate to the occasion. It embodies the results obtained by an examination of the various types of apparatus at present on the market.

Tests of the relative efficiency of a gas-oven should, says the author, comprise both experimental and practical investigation. The first includes degree of completeness of combustion, liability to back-fire, ignition and travel of the flame, the general adequacy of the burner, time occupied in raising the temperature of the empty oven to (say) 500° Fahr. when using the maximum rate of consumption of the properly adjusted burners at an agreed pressure—say, 50 10ths—and determination of the quantity of gas used, followed by a cooling test, including minute observations of the temperature down to (say) 200° Fahr. Another series of tests should elicit the maximum attainable at several different rates of consumption, as by the comparison of such results with those obtained under standard conditions of (say) 20 c.ft. per hour at 50-10ths pressure; and some interesting figures would be obtained. The temperature data could be plotted in curves on section paper, showing degrees of temperature on the horizontal and cubic feet of gas consumed on the vertical lines. The heat lost by the flue may be estimated by allowing the oven to reach a constant temperature under standard conditions, with an open flue of given length, not connected to a chimney. Samples of the flue gas were taken near the top of the flue; the temperature of this, and also that of the oven, being carefully checked at the same time. A test of the calorific value of the gas supply is also required. From these data, the proportion of excess air, the total volume of the flue gas, and the percentage of heat carried away from the oven can be calculated; and these figures vary widely in different makes of cookers. The temperature distribution in he oven may be investigated by placing thermo-couples in suitable positions.

The practical test included measurement of the gas required to produce certain standard results. To get equal conditions in roasting, a thermo-couple was inserted at the centre of the joint; and when it indicated 160°, which gave a well-done roast, the cooking was considered complete. Joints of 3 to 3½ lbs. weight were used, as near as possible of the same grade of meat. Heat tests could also be made by noting the colour attained by biscuits placed in various parts of the oven. It was thus possible to determine the comparative efficiency of any make of oven. A chart was exhibited showing temperature tests on: (1) A single case ventilated oven; (2) an insulated and ventilated oven, A; (3) an insulated externally heated oven; (4) another type of No. 2, B. The temperature was allowed to become constant before each observation; and the heating value of the gas used was 665 B.Th.U.

	1	2	3	4
10 c.ft. per hour	280	340	480	620
20 c.ft. per hour	440	580	780	860

Another chart showed the cooling in empty ovens. The single-cased oven fell to 200° within 45 minutes after shutting off the gas; but the insulated ovens remained above this limit for 2½ hours.

The following table gives the tests of the four types of ovens (using formulæ set forth in the paper):

	1	2	3	4
Gas consumed per hour	20	20	20	20 c.ft.
Flue temperature	312°	430°	420°	492° Fahr.
Oven ,,	447°	580°	868°	777° ,,
Gas, B.Th U.	672	675	668	672
Flue gas—CO_2	1·1	2·1	5·7	2·5 p.ct.
O	18·5	17·5	12·4	16·4 ,,
N	80·4	80·4	81·9	81·1 ,,
Cubic feet of flue gas per hour	1607	842	310	707 c.ft.
Excess air per cubic foot of gas	73·5	35·2	8·8	38·5 ,,
Flue loss of heat	59	46	19	47 p.ct.

In conclusion, the author expressed preference for the insulated externally heated oven.

Southampton Gas Light Company.—The report submitted at the half-yearly meeting of the Company last Wednesday stated that the sale of gas for the past six months showed a slight falling-off from the corresponding period of 1915. The profits amounted to £18,291; and the balance available for dividend on the ordinary stock, after payment of debenture interest and other charges (to which was added £2555, the undivided profit from the previous half-year, and £84 interest), was £18,149. The Directors recommended that the maximum dividend of 5 p.ct. per annum, amounting to £16,193, for the half year, be paid (less income-tax), leaving a balance of £1955 to be carried forward.

Wages Award at Leeds.—At a meeting of Leeds City Council last week, Alderman C. H. Wilson announced an award by a Government Arbitrator in an application by the tramway workers for advanced pay. The award was for 7s. per week war bonus, and various details as to overtime and women's payment. Alderman Wilson said the General Purposes Committee had decided to adopt this award in respect of officials and workpeople in all the Corporation departments, except in those cases in which war bonus or increased wages have been allowed pursuant to agreement between organized bodies of workpeople and employers, and in which the conditions of engagement exclude any war bonus. The present general war bonus is 5s.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

The Board of Trade and Sliding-Scale Gas Companies.

Sir,—Recent correspondence in your columns has clearly established the injustice to shareholders in gas companies working under the sliding-scale clauses through the maintenance of a pre-war standard price.

An analysis of the purchase price of all stock, subject to the operation of the sliding-scale, in the case of the Preston Gas Company, shows a gross return, when paying standard dividends, of 4·9 p.ct. on the 10 p.ct. stock and 4·7 p.ct. on the 7 p.ct. stock; and under prevailing conditions the shareholders are entitled to this return.

I would suggest that as the majority of sliding-scale companies are certified under the Munitions of War Amendment Act, 1916, and any labour differences are referred to the Industrial Commissioner's Department of the Board of Trade, they should seek the assistance of the Board to protect shareholders who have provided capital for an essential industry.

While it is not practicable for an individual undertaking to promote a Special Bill to suspend the operation of the sliding-scale or modify the standard price, the Board of Trade possess the necessary power to effect this by the issue of an Order in Council under the Defence of the Realm Act.

The attention of the Board has been drawn to the fact that they have already varied the statutory provisions affecting other public utility undertakings, as shown by the following extract from an Order in Council dated April 14, 1917.

> Section (7) After regulation 39B the following regulation shall be inserted: 39BB. If in the case of any harbour or dock undertaking carried on under statutory authority it appears to the Board of Trade that it is necessary for the successful prosecution of the war that the undertaking should be carried on in an efficient manner, but that, owing to circumstances arising out of the war, it cannot be so carried on without charging rates, dues, or charges in excess of those which the undertakers are authorized by Statute to charge, the Board may, by Order, authorize the undertakers to charge such rates, dues, or charges in excess of the statutory maxima as the Board think necessary in the circumstances, subject to such conditions as may be specified in the order.

It is quite possible that collective pressure may induce the Board to take action.

Samuel Tagg.

Preston Gas Company, Fishergate, Preston, May 2, 1917.

Education and Training of Engineering Apprentices.

Sir,—After carefully perusing the excellent paper by Mr. H. A. Bennie Gray read before the "S.B.G.I.," and the discussion which followed (fully reported in the last number of the "Journal"), there are one or two points bearing on the subject which should be considered in dealing with the education of our apprentices.

No one will dispute the great and urgent necessity for drastic reforms in our educational system; but such reforms cannot be carried out piecemeal, as suggested by Mr. Gray. The future of our country does not depend upon any one industry, but on the whole of the industries; and this will necessitate the question being reviewed from an infinitely wider standpoint.

Mr. Gray's suggestion commences with a boy of fourteen years. But I contend that we must start at the commencement of the child's school life, and not at the end of it. Fortunately, the present President of the Board of Education is an expert, and great things are expected of him; for never before has this department been controlled by such an able and qualified man.

The whole country needs awakening to the needs of education; and the whole weight of the leaders of industry should be thrown into the scales. Further, the leaders of trade unions should energetically and sincerely co-operate; for educational reform will benefit the men even more than the masters.

The great weakness of our present educational system lies in the fact that the vital necessity to the welfare of the country has always been in the hands of people who know little or nothing about it. For example, the higher post—namely, that of the head of the Education Department—has in the past been a shuttlecock in the game of politics, and has often been filled by men who were utterly incapable of moving with the times. I venture to think that no firm would ever dream of appointing a managing director or general manager who knew little about, and had no experience in, its particular line of business; yet this is what the country has suffered for many years in educational matters. The present Cabinet, however, gives us great hopes for the future.

Then, again, our local education authorities consist of men chosen by the ratepayers—often for any other reason than educational. Consequently, we often find a farmer and an ironmonger or a grocer controlling the education of a large area. This, again, should not be tolerated.

In every district the curriculum of the schools should be more or less linked with the industries of the district. To illustrate the present chaotic system, I will state a case. I know a school in a mining village where the head master was anxious to give lessons to his older boys in the gases to be found in the coal mines; yet the local education authority declined to allow the purchase of the necessary apparatus for such lessons, and the master either had to find the cost of it out of his own pocket or abandon the lessons. Mr. Gray's own experience with regard to engineering classes in Huddersfield affords an even better illustration.

I would advocate the commencement of technical education in every elementary school, and not wait until we arrive at the end of a boy's school life. And here I would advocate much closer co-operation

between the works and schools. How infrequently it happens that the manager of a works confers with the education authorities in the choice of apprentices. The person who has had a boy under his observation daily for seven or eight years is rarely consulted as to his suitability for a certain post. I cannot help but think that, if a little more care were taken in the choice of apprentices, there would be very few "who show no ability to profit by the education offered," as referred to in Mr. Gray's paper.

Having, therefore, obtained suitable apprentices, the provision of their future education should not be undertaken privately by individual firms. This should be a State charge. Various grades of scholarships endowed by the State, and not by the trade (as suggested by Mr. Gray), should afford a brilliant boy the opportunity of obtaining the most advanced engineering education possible.

In order to arrive at these ends, I would advocate a conference between masters and men, with a view to laying their views before the President of the Board of Education.

R. J. MILBOURNE.

Lilleshall Old Hall, near Newport, Salop.
May 4, 1917.

Blue Water Gas as a Diluent.

SIR,—I venture to protest against the statements which are being publicly made as to the proportion of uncarburetted water gas which it is possible to send out for use by consumers.

I also venture to add that in many towns the circulation of 25 p.ct. of such gas would result in serious and justifiable complaints.

Taunton, May 5, 1917. A. EDWARDS.

[The protest by Mr. Edwards is unaccompanied by what would have been very interesting—the reasons for the protest. The proportion of blue water gas mixed with coal gas should be determined by the quality in respect of composition of the latter. For instance, in the case of an undertaking wrongly sending out in its gas (as some have been doing, and some are probably now doing) 25 p.ct. to over 30 p.ct. of incombustibles, an addition of 25 p.ct. of blue water gas would not be desirable. We can understand, too, that in places where a poor gas-making coal is being used, there may be good cause for adopting a lower percentage. We ask Mr. Edwards's attention to the remarks made by Mr. Thomas Glover and the President of the Institution of Gas Engineers (Mr. A. E. Broadberry) at the meeting of the Eastern Counties Gas Managers' Association as reported this week, and to an editorial article on the subject of their remarks. It may soon be not a matter of like or dislike in some cases, but one of absolute necessity for coal gas to be diluted where a water-gas plant exists. Opposed to Mr. Edwards's protest is the fact that there are undertakings who are already, and have been for some time, distributing a mixture of coal and blue-water gas. If Mr. Glover can do it, why cannot other engineers whose conditions are similar?—ED. "G. J."]

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for May 2.]

Nos. 5634—6251.

BAGLEY, D. & E. A.—"Method of introducing combustion gases into heating-flues of coke-ovens, &c." No. 5920.

BLOKHUIS, J. K. F.—"Inverted burners." No. 5634.

BRAYSHAW, E. R. & S. N.—"Gas-fired furnaces for pottery, &c." No. 6008.

CHRISP, G.—"Effecting continuous absorption of a gas or some constituent of a gas by means of a solid absorbent." No. 5649.

FOULKES, J.—"Destructive distillation of wood." No. 5774.

HALL, I.—"Indicating, regulating, and controlling temperatures." No. 5819.

HARGER, J.—"Treatment or purification of mixtures of hydrogen and carbon monoxide, for separation therefrom of the latter." No. 6007.

IONIDES, A. C.—"Melting-furnaces." No. 5980.

KLOTZ, A.—"Bunsen burners for gas-heaters for sweating-baths." No. 5746.

MAJOR, J. L.—"Distillation or evaporation of liquids." No. 5915.

MAXTED, E. B.—"Production of concentrated nitric acid from ammonia." No. 5857.

TAYLOR, G.—See Chrisp. No. 5649.

TERREY, H.—See Harger. No. 6007.

THORP, F. & H. T.—"Fluid meters." No. 5862.

YATES, H. J.—See Brayshaw. No. 6008.

North Shore (Sydney) Gas Company.—At the annual meeting of the Company, Mr. P. T. Taylor (the Chairman) said that during the past year there had been a small increase in the sales of gas; but, on the other hand, the expenses had grown in practically the same ratio. The completion of the work at Oyster Cove had been considerably delayed, through the British Government taking control of all factories—among them the works of West's Gas Improvement Company, Ltd., the Company's Contractors—that could be utilized in the manufacture of munitions of war. There had also been a coal strike, which had affected the profits. The capital expenditure during the year had been nearly £36 000; and the profits had been utilized to meet this. Thus they were in the peculiar position of not having the requisite money to pay a dividend, although the profit had been made. The Directors had therefore been reluctantly compelled to recommend that the payment of the dividend of 3 p.ct. for the past half year be deferred to a date to be fixed by the Board.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

Progress of Bills.

The Gas Light and Coke Company's Bill was read a second time, and committed.

The Hemel Hempsted Gas Bill, the Lea Bridge District Gas Bill, and the Haslemere and District Gas Bill were read a third time, passed, and sent to the Commons.

The Kenilworth Gas Bill was reported, with amendments.

HOUSE OF COMMONS.

Lighting of Tipperary Barracks.

Mr. JOYNSON-HICKS asked the Under-Secretary of State for War whether the Tipperary Barracks were formerly lighted by coal gas, necessitating the carbonizing of about 400 tons of coal per annum, from the residual products of which toluol could have been produced; whether such barracks are now lighted by petrol gas; what is the annual consumption of petrol for the purpose; and why, in the present scarcity of petrol, a return should not be made to coal gas.

Mr. FORSTER replied that instructions to return to coal gas were issued on April 11.

Progress of Bills.

A Provisional Orders Bill, to confirm certain Provisional Orders made by the Board of Trade under the Gas and Water Works Facilities Act, 1870, including the Stretford Gas Order and the Tonbridge Gas Order, was presented, read the first time, and referred to the Examiners of Petitions for Private Bills.

The Hemel Hempsted Gas Bill, the Lea Bridge District Gas Bill, and the Haslemere and District Gas Bill were read the first time, and referred to the Examiners.

The South Staffordshire Mond Gas Bill was read a second time, and committed.

SHEFFIELD GAS BILL.

HOUSE OF COMMONS COMMITTEE.—Thursday, May 3.

(*Before Mr.* MOONEY, *Chairman, Sir* J. HASTINGS DUNCAN, *Mr.* BIRD, *and Mr.* TIMOTHY DAVIES.)

This Bill, promoted by the Sheffield United Gaslight Company, provides for the conversion of the existing capital of the Company, the raising of new capital, the changing of the name of the Company, the construction of additional works, supply of coke-oven gas, &c.

Counsel for the Bill were Mr. G. J. TALBOT, K.C., and Mr. A. M. PADDON. The only opponent, the Sheffield Corporation, was represented by Mr. HONORATUS LLOYD, K.C., and Mr. JEEVES.

Mr. TALBOT, in his opening speech, said that the Sheffield United Gaslight Company was one of the best-managed gas companies in the country; the price of gas being 1s. 9d. per 1000 c.ft., notwithstanding the difficulties of the present time—a fact tending to show that the Company's object had always been to keep down the price of gas. The only opposition came from the Sheffield Corporation; but there was nothing in the Bill which could possibly injure the interests of the consumer. With regard to the first proposal—the conversion of the capital—it was proposed to convert the existing £868 984, which under a kind of sliding-scale was entitled to a maximum dividend of 10 p.ct., into new stock, £2 of which would be issued in exchange for every £1 of existing stock. This would do what Parliament had frequently sanctioned—viz., convert a 10 p.ct. stock into a 5 p.ct. stock—a conversion which would not affect the interests of the consumers in the slightest degree. The Corporation seemed to have an idea that if the proposal were sanctioned, the cost of the gas undertaking would be enhanced if they wished to purchase at some future time; but no definite proposal to purchase was put forward. On the other hand, the Corporation themselves had a Bill in Parliament this year proposing an expenditure of £2,500,000 upon their electricity undertaking. So far as the general position in Sheffield was concerned, the demand for gas was going up by leaps and bounds—recently at a much higher rate than formerly. In 1910, the consumption was 3,679,000,000 c.ft., and in the year 1916 it had risen to 5343 millions, or an increase of 47 p.ct., in spite of a large diminution in public lighting. There had, however, been a very large increase of gas for gas-engine and power purposes generally. Coming to the proposed new works, for which the bulk of the new capital is required, Counsel explained that as no site has been actually taken, it was impossible to follow the usual course and schedule the site in the Bill. The scheme was to increase the Company's gas manufacturing capacity from 22 to 37 million c.ft. per day in order to meet the increasing business. At the same time, the negotiations for a site were in an advanced stage. Under the provisions of the Bill dealing with new capital, it was proposed to raise an additional £600,000 by way of share capital and £580,000 by borrowing; and this, together with the unexercised borrowing powers, would place the Company in a position to raise £1,250,000 of new capital without application to Parliament.

Mr. HONORATUS LLOYD, referring to the new works, pointed out that the Sheffield Corporation, in their Bill this year, scheduled the site in the Bill.

Mr. TALBOT said it was a little ungracious for the Corporation to oppose the new capital powers, seeing that they were themselves proposing to spend double the amount. It would be, however, for the promoters to justify their proposals; and he believed his witnesses would be able to show that the provisions of the Bill were in the public

interest. In addition to the points mentioned, the Corporation in their petition drew particular attention to several others. Objection was taken to clause 22, which provides for the establishment of a sinking fund out of revenue which may be applied for any capital purposes. This fund may not exceed the amount which would be produced by 1d. per 1000 c.ft. supplied during any year, provided that the total amount shall not at any time be greater than the additional capital (including loan capital) which shall have been issued. The Corporation object on the ground that the only object of such a fund is to absorb surplus profits which would otherwise be applicable to a reduction in the price of gas. It was also pointed out that the fund could exceed the amount of the present total capital of the Company. Opposition was also offered by the Corporation to the proposal to supply coke-oven gas; it being pointed out that it might be supplied to the ordinary consumers under the Act, and yet not be of the calorific value prescribed under the Company's existing powers. It was asked that the accounts of the supply of this gas should be kept separately; otherwise the profits derived from the main gas undertaking might be absorbed by losses made on the power gas undertaking; thus preventing a reduction in the price of the ordinary gas. A number of other matters of detail are also called attention to in the petition, including the power to manufacture residual products, the clause relating to which is in the standard form.

Mr. *Hanbury Thomas*, the Deputy-Chairman and Managing-Director of the Company, said it was proposed to change the name of the Company to the Sheffield Gas Company. The object of converting the stock was the usual one—that a 5 p.ct. stock is more marketable than a 10 p.ct. stock. In connection with the increasing demands upon the Company for gas, he mentioned that from the year 1910 to 1913, the increase in the output was 24·67 p.ct., and from 1913 to 1916 the rate was 20·34 p.ct. The increase was particularly noticeable in regard to gas-engines. In 1913 the consumption for engines was 620,845,000 c.ft.; while in 1916 it amounted to 897,154,000 c.ft., or an increase of 45·5 p.ct. in three years. Some typical consumers were Messrs. Hadfield's, 300,161,000 c.ft. in 1916 compared with 137,140,000 c.ft. in 1910; Messrs. Allen & Co., 83,426,000 c.ft. compared with 15,425,000 c ft.; and Messrs. Vickers, 79,000,000 c.ft. compared with 24,000,000 c.ft. A large quantity was also being used for furnace purposes. Witness handed in some photographs showing types of furnaces now using gas in Sheffield. All this, he explained, is the development of old consumers who formerly used solid fuel. But new uses cropped-up every day, even to the extent of propelling an omnibus now running in Sheffield. During the first four months of this year, the increase was at the rate of 11·42 p.ct. over the corresponding period of 1916, and this notwithstanding that during January the Company were obliged to reduce the pressure below the standard owing to shortage of labour. Retorts were frequently standing idle for want of men to charge them. Commenting upon the proposed sinking fund, he justified this on the ground that the expenditure on new works in the future would be much greater than in the past, on account of the increased cost of labour and materials; but, by setting aside a sinking fund to pay for such abnormal expenditure, these extra capital charges were not a permanent charge on the working costs. In this way, the cost of production would be reduced, and the consumer in the long run would benefit. If it were not wrong for a municipality to set aside a sinking fund, it should not be so for a company. Another benefit to the consumer would be that the stock would fetch a higher price, because the security offered was better. Witness then went to the question of the residual products.

Mr. Honoratus Lloyd, for the Corporation, said he did not object to the Company making residuals so long as it was done in a suitable neighbourhood, and the Company were liable for nuisance if they made one. The Bill asked for permission to spend money on works; but the site was not indicated, because nobody knew.

Examination continued, witness said that, in regard to the supply of coke-oven gas, provided for under clause 36, the position was that various colliery companies in the district were at present wasting large quantities of the gas; and the Board of Trade a short time ago sent a representative to the Company who asked if they were willing to assist in bringing the gas into Sheffield. At that time the Company had not powers to do so, because the gas was not of such a high calorific standard as the Company were bound to supply under their Acts. Hence the present application. The gas would have to be purified; but there were several large firms, such as Hadfield's, who would take all the available waste gas of the kind if it could be supplied to them. Any powers of this sort, however, must contain a clause to the effect that the Gas Company would not be held liable for failure of supply due to a coal strike. Without the intervention of the Company in the manner suggested by the Board of Trade, this waste gas could not be used.

Witness, in cross-examination by Mr. Honoratus Lloyd, explained that the Company are working under a sliding-scale which was one of the first ever applied to the gas industry. It provided for a standard price of gas of 2s. 9d. per 1000 c.ft., with a maximum dividend of 10 p.ct. This dividend had been paid on the "C" stock since 1878, and on the "B" stock since 1864. Witness agreed that, for all practical purposes, the sliding-scale had ceased to operate, as there was a margin of 1s. per 1000 c ft., even at the present price of 1s. 9d., before it would operate.

Counsel pointed out that 1d. per 1000 c.ft., the proposed sinking fund, on the present consumption was equivalent to £22,000; while the difference between the present actual and the standard price represented a sum of £264,000. All this money the Company would have to play with in their coke-oven gas business before their maximum dividends would be affected. In other words, the price of gas might be raised another 1s. without affecting the shareholders; and the consumers took the whole of the risk.

Witness replied that he was quite certain coke-oven gas would not be touched unless a profit were assured. The Company were not over-keen about it; but having been asked by the Board of Trade, and realizing that there was a great national waste going on, the Company were willing to assist in doing what was suggested.

Mr. Honoratus Lloyd pursued the point, and suggested that the Company should be forced to share the risk with the consumer—in other words, that the modern sliding-scale should be applied to the Company.

Witness said the coke-oven gas business would be less speculative than the ordinary business; but the Company were not asking for the present sliding-scale to be changed.

Mr. Talbot objected to this point being raised, as it was not in the Corporation's petition.

The Chairman, however, thought the general wording of the petition was sufficiently wide to cover this point.

Witness said he was not anxious for the Company to be placed under the ordinary sliding-scale.

Mr. Honoratus Lloyd then put questions purporting to show that, in normal times, the Company's working expenses were less than 1s., that coal cost less than nothing owing to the return from residuals, and that the capital charges were 4·7d. per 1000 c.ft. Hence, a price of 1s. 4d. per 1000 c.ft. would be sufficient in normal times to maintain the maximum dividend of 10 p.ct.

Answering further questions, witness said the Company had been on the look-out for new works for a long time, and had two sites in view. The negotiations, however, were not complete.

Counsel suggested that the proper course would be to leave out of the capital powers the £1,000,000 which it was estimated would be required for the works until the time came for the Company to apply to the Board of Trade for permission to use the land for gas purposes, if it were acquired by agreement, or to Parliament if compulsory powers were necessary. The capital was no good without the site.

Witness thought it the most convenient to apply for all the new capital in one sum.

The discussion between witness and Counsel as to the sinking fund turned largely upon the question of using revenue for capital purposes, which, said Counsel, the whole tendency of legislation was to avoid. Witness contended that the sinking fund would act in exactly the same way as a municipal sinking fund. He was unable to say how much revenue had been spent on capital purposes during recent years, but did not think it was much. He agreed that for the past ten years the capital expenditure had been some £10,000 a year. Yet, commented Counsel, there had been this enormous development going on.

Justifying the departure in the auction clauses made in the Bill—viz., that the Company need not offer stock for auction a second time before offering it to the shareholders—witness said stock in these circumstances never sold well, as the public knew it had already been put up, and it could only be offered to the shareholders at the reserve price. The clauses relating to redeemable capital were intended to mean redemption out of capital, and not revenue.

In re-examination, witness maintained that the manner in which the price of gas had been kept down in Sheffield was a sufficient indication that capital had not been spent extensively out of revenue. The Company had reduced the price whenever there was an opportunity, and should be given credit for it.

In answer to Sir J. Hastings Duncan, witness said that no definite proportion of the new capital had been set aside for dealing with coke-oven gas.

Friday, May 4.

On the resumption of the proceedings to-day,

The Chairman asked if the Corporation were opposing the Bill absolutely. If so, perhaps the opposition had better be proceeded with at a further stage downstairs.

Mr. Honoratus Lloyd said his clients admitted the right of the Company to a reasonable amount of capital to carry out necessary work; but it was desirable that it should only be a reasonable amount. Nothing should be done at present which would prevent discussion of details afterwards.

Mr. *J. W. Morrison*, the Chief Engineer to the Company, was then called on the question of the estimates for the new works. It was proposed to build new works with a capacity of 15,000,000 c.ft. per day, to be connected with the existing works by a trunk main. If they secured the site for which they were negotiating, the length of the trunk main would be three miles. The estimated cost of the new works was put at £1,004 000.

Answering Mr. Honoratus Lloyd, witness said the cost had been arrived at by taking pre-war prices and adding 50 p.ct. He had taken a 5 p.ct. increase

Mr. *E. H. Stevenson* said the Company had erred on the side of caution in estimating their capital requirements. He did not think the amount asked for would carry them on for more than seven or eight years; nor did he think the new works could be constructed for the amount suggested, having regard to the increasing cost of labour and materials. Something should be added, also, for distribution plant; and the usual proportion of one-half would add another £500,000 to the sum required. To carry the Company on for fifteen years—which was the usual period—a sum of £2,452,000 would be required, or £1,542,000, with distributing work, for ten years. As to the sinking fund, he thought it right and proper, in such times as these, for some portion of the enhanced capital expenditure to be paid off in the way suggested, instead of allowing it to be a permanent charge on the undertaking. A sinking fund of 1d. per 1000 c.ft. was very much less than many undertakings were spending on capital out of revenue. To apply the ordinary sliding-scale to the undertaking now would be a breach of the bargain Parliament had made with the Company and a hardship to the shareholders. Furthermore, it would affect the consumer, because, as things at present stood, he got the full benefit of any reduction in price; and this would not be so under the ordinary sliding-scale. There was also the unfairness of fixing a standard price in a time like the present. It was better for the Company to deal with the coke-oven gas than to have a separate company, which would undoubtedly be formed if the Bill was not passed.

In cross-examination, witness agreed that the sinking fund was unusual. But the same thing, in effect, was being done continually through repairs and maintenance. He did not agree that the difficulty of arriving at a fair standard price would be got over by allowing the Board of Trade to fix a price at the end of three or five years. The Company were not asking for the sliding-scale. In the few cases

during the war where a standard price had been fixed, it was done at the request of the promoters.

The CHAIRMAN: Do you think the sinking fund is desirable in the special circumstances of this case?

Witness: Yes, because the abnormal expenditure the Company will have to incur ought to be borne partly by the present consumers. It does not put anything into the pockets of the shareholders.

Sir HASTINGS DUNCAN: Is it proposed to limit it to a term of years?

Witness: It is indefinite in the Bill; but I am not sure whether it would not be a good thing to limit it to a proportion of the capital that will have to be raised for the new works.

The CHAIRMAN: It is establishing a precedent. Do you think that desirable?

Witness: I do not know why not. There are very few companies in the position of this one; and I do not see why, in the peculiar circumstances, the Company should not have some relief. I think it would almost be better to do it in this way than for the Company to do what other companies have done—simply call it repairs and maintenance. It prevents the Company using more than the 1d. per 1000 c.ft.

Mr. *Harry E. Jones* confirmed the previous evidence. The question of new works was very urgent. Sheffield could not wait, otherwise the town would be in darkness. It had been nearly in darkness last winter. In his opinion, the rate of increase would be 6 p.ct., and the new works would be required to be in full use within eight years.

In cross-examination, witness said the works represented more capital in fact than they did in name. Therefore there was full security for the one-third borrowing powers on the converted capital. As to the sinking fund, he was not sure he understood it. It had its origin in apprehensions as to what would be the condition of things after the war; and if other companies took a more careful view of their capital and redeemed some of it, it would really be a good thing for the consumers.

Mr. *J. Ferguson Bell*, Engineer to the Derby Gas Company, estimated that the present output would be doubled in eight years, and thought that the proposed capital was if anything too little.

Answering Mr. HONORATUS LLOYD, on the question of having the capital authorized before the site, witness said there were many matters that could be pushed ahead if the Company had authority to raise the capital, even before the rate was actually settled, and it saved time.

Mr. *W. Cash*, who handed in tables analyzing the result of the Company's financial working, admitted that the proposed sinking fund was a novel proposal, but justified it on grounds similar to those already put forward. It would be necessary, however, to provide that any money so raised should be regarded as capital; and to this extent the total capital to be raised under the Bill would be reduced. Separate accounts for the coke-oven gas supply would be troublesome, and he did not think it was quite fair to have to publish to all the world what was really a departmental profit and loss account. The Company were not likely to embark on a commercially unsound business; and any figures given as to management, distribution, superintendence, &c., must be largely a matter of estimate. The modification of the auction clauses followed exactly the clauses in the Newcastle Bill of 1916, and there had been a number of precedents for them in 1915 and 1916.

Mr. HONORATUS LLOYD put questions from which it was made clear that the intention of the sinking fund was that any money put by was to be regarded as part of the capital authorized, and that no sinking fund could be set aside until capital had been raised.

This closed the case for the Bill.

Mr. HONORATUS LLOYD, addressing the Committee on behalf of the Corporation, said he did not suggest that the Company were badly managed. Sheffield was lucky in that it had a Company which had grown up under conditions which were favourable to the working, and the result was that the consumer got gas at a very cheap price. He maintained, however, that in years gone by substantial sums had been spent out of revenue for capital purposes, although the consumer of to-day was reaping the benefit of this. He did not object to the Bill as a whole. The view of the Corporation was that the Company should be allowed a fair sum of money to deal with the immediate demands upon the works, but that the capital for the new works should be dealt with at the same time that the consent of the Board of Trade was obtained. Then the whole matter could be gone into, and the Corporation could also see whether the time had then come for the question of purchase to be dealt with. He asked the Committee not to prejudge the question by granting the Company large capital powers before the site had been obtained, because, under present conditions, it was impossible to say what the ultimate cost would be. All he asked the Committee to do was to grant the Company sufficient capital to carry them on for the time being, until the complete scheme for the new works was put forward. Dealing with some of the more important details of the Bill to which the Corporation objected, Counsel said there had been no expressed desire on the part of the shareholders to have their stock reduced from 10 p.ct. to 5 p.ct., and in present circumstances it would mean that new stock would have to be sold at a discount. If the ordinary statutory one-third borrowing powers on the nominal capital were asked, he should not object. This would be roughly £290,000. One-third of the converted capital, however, amounted to £580,000; and, summing up the position as regards capital, he suggested the following as a fair decision in present circumstances. He proposed to leave out any question of the capital for new works. The one-third borrowing powers upon the nominal capital powers would be £289,494, from which would be deducted £90,000 already issued, leaving unissued £194,494. From this amount must be deducted £75,919 overspent; and the only available sum would therefore be £118,975. This would be sufficient to carry the Company on for a few years, until they came to Parliament or the Board of Trade with a complete financial and engineering scheme for the new works. If the Company claimed that the time was inopportune to raise the question of imposing the sliding-scale—and he was inclined to agree—surely it was equally inopportune to do anything which would prevent the Corporation from raising the general question of the whole position of the Company when they came forward with the scheme for utilizing the new site. If the capital powers were granted now, this would be the position that would be created. The proposed sinking fund bored a hole right through the bottom of the Gas-Works Clauses Act, and was admittedly an innovation. The only justification for it was the increased cost due to the war, which it was said should at any rate be borne partly by the consumer of to-day. He saw no reason for this, and asked that the clause should be rejected. As to coke-oven gas, he did not desire to put anything in the way of a cheap supply of gas of this kind, for which there might be a considerable future; but whatever was done, he asked that the Company should not be given general powers to speculate at the expense of the ordinary consumer, and that the Company should be made to be partners with the consumers in this affair. That was why he asked that the ordinary sliding-scale should be applied. He asked the Committee to bear in mind that at present the Company had a margin of 1s. per 1000 c.ft. to play with before their 10 p.ct. dividend could be touched.

The CHAIRMAN: Is not your argument to reduce the capital and apply the sliding-scale?

Mr. HONORATUS LLOYD said no. What he was asking was that the Company should have sufficient capital to carry on for a few years; leaving it to the Board of Trade to fix the standard price at the end of a period.

Alderman *Styring*, in giving evidence, said he was a shareholder in the Company. He complained that the Corporation Directors on the Board were not aware until October that this Bill was going to be promoted. The whole scheme had been hurriedly considered, and was inimical to the interests of the city. He could not help feeling that there was a fallacy in the figures, because he could not conceive that the Company would require so much capital as £1,250,000.

In cross-examination as to the manner in which the Bill was inimical to the interests of the city, witness mentioned, as a concrete example, the possibility of Parliament prohibiting the use of solid fuel. This would necessitate the smaller houses being fitted with gas cooking and heating apparatus; and Parliament might consider that local authorities should provide this—the cost to be paid for in weekly payments.

The CHAIRMAN: Surely that would require a General Act dealing with the whole country?

Witness said it was recognized that there was a monopoly in their midst in Sheffield, and the Corporation ought to be in the position to deal with it at short intervals. There was a strong feeling against the Company for reducing the illuminating power, and, more recently, because they took advantage of an Act of Parliament to apply the calorific power standard, and had not given the consumers any chance of considering the question. The gas was deplorably bad at the present time. If the undertaking had been in the hands of the Local Authority, it would probably not have put the Act into force.

Mr. TALBOT reminded witness that the Act was passed specially by the Government on account of the need for munitions.

Witness agreed, but thought that the Local Authority would have met these needs without putting the Act in force.

Regarding the position of the Corporation's nominee Directors, Counsel pointed out that Board meetings were held in October and November last year, at which two of these Directors were present. Yet they made no report to the Corporation.

Mr. *W. B. Keen*, chartered accountant, gave evidence to the effect that, with a standard price of 1s. 4d., the Company during the past ten years could have paid a dividend of £10 2s. 6d.

The CHAIRMAN asked if the Corporation were wholly opposed to the supply of coke-oven gas, or would they be satisfied if the Committee restricted it so that it could not be used for lighting purposes. [The Bill, as originally deposited, provided that coke-oven gas should not be used for lighting; but the filed Bill modified the clauses in order that this gas should be used for lighting.]

Mr. HONORATUS LLOYD said he did not want to object to coke-oven gas if the Committee thought it was in the interests of the public. His argument was on the financial side—that the Company should not go into this business and place all the risk on the consumer.

Mr. TALBOT, replying on behalf of the Company, said he was willing that the Committee should say that no part of the £1,000,000 for the new works should be used for any other purpose. If the Committee reduced the borrowing powers to one-third of the nominal capital instead of one-third of the converted capital, then he asked that the share capital should be correspondingly increased, because the Company wanted the money.

COMMITTEE'S DECISION.

The CHAIRMAN, in giving the decision of the Committee, said the preamble of the Bill was proved. The sinking-fund clause, however, would be deleted; and there would also be an alteration in the clause dealing with coke-oven gas—putting in the limitation that was in the original Bill—that coke-oven gas must not be used for lighting.

As there are a number of clause matters upon which the Corporation and the Company had not come to any agreement, an adjournment was made until to-morrow (Wednesday), when these will be discussed before the Committee.

[Mr. Arthur Valon was retained on behalf of the Corporation, but was not called upon to give evidence.]

Wages at Bolton.—The Bolton Corporation have referred to a Committee a letter from the Gas-Workers' Association applying for an increase of 5s. 6d. per week war bonus for all the members of the Association employed in the Gas Committee's department, so as to bring their total war bonus up to 12s. per week. In this connection, there is a suggestion that a conference of the local authorities of South-East Lancashire should be held in Manchester at an early date with a view to some uniform action being agreed upon.

Dearth of Meter Testers.—Reporting upon the release of men of military age employed at the Gas-Meter Testing-Station, the Middlesex County Council state that the work is skilled, and requires considerable technical knowledge. It takes a period of six months for a man to become proficient to test a new meter, and two years' training before he becomes proficient to test a disputed meter. In normal times the number of men in the country competent to do this work is very limited, and difficulty was in fact experienced prior to the war in obtaining the services of competent men. In present circumstances, therefore, it is much more difficult to find other competent men of any age.

MISCELLANEOUS NEWS.

THE FRENCH PROFESSIONAL SYNDICATE OF THE GAS INDUSTRY.

The annual report of the Syndicate for the year 1916, which has just been published, marks even more than the two immediately preceding a further step towards the complete representation of the French gas industry within the membership of the Syndicate. During last year 87 new members were enrolled, as compared with 56 in the preceding twelve months. At the present time the membership is 279—almost double that at the outbreak of war. Notable among those who have come to the support of the Syndicate are MM. Gabriel Chamon, of the Paris Gas Company, Albert Petache, of the Lyons Water and Lighting Company, and H. Coqueugnot, of the Schneider firm of Creusot. The Syndicate has not much further to go in its aim of complete representation; for over 90 p.ct. of the gas-works in France are now connected with it.

The President, M. René Masse, in briefly referring to the losses which the Syndicate had sustained in the deaths of its members during the first year, paid an eloquent tribute to the memory of the late Sir Corbet Woodall, speaking of him as one of the leading figures of the gas industry throughout the world, and testifying to the respect and personal esteem in which he was held by those in French gas circles. M. Masse was one of those who were, as he says, privileged to observe Sir Corbet Woodall's last active work for the material benefit of the Allies in the present warfare; and he joins with Great Britain in lamenting the passing of a great and patriotic leader, the memory of whose genius and personal charm will be long preserved in the industry with which he was connected.

The Syndicate's report covers a wide field, but is chiefly devoted to the position the body now occupies in the national circumstances created by the war, the many questions which have been the subject of its consideration, and its views of what the future calls for in the way of anticipation and preparation.

The year witnessed a great increase in the Syndicate's propagandist work—particularly in the circulation among its members (and, in certain cases, among non-members) of the documents, proclamations, &c., indispensable to the industry in undertaking friendly negotiations or in setting in motion legal processes with respect to increases in the price of gas. Questions of general importance have been the subject of its inquiry from various Government Departments; and on the ever-acute problem of coal—"agonizing," say our French friends—an active statistical programme has been completed. The paucity of exact figures which was the case a year ago has been remedied; and this branch of the Syndicate's work has been brought to a pitch of efficiency which, it is hoped, will henceforth be maintained. These wider activities have called for greater revenue, which is to be found by putting the payments to the Syndicate (apart from a personal subscription of 20 frs. per member) on the basis of the tonnage of coal carbonized, according to the following scale: For 1000 to 5000 tonnes, 1 vote; for 5000 to 10,000 tonnes, 2 votes; 10,000 to 15,000 tonnes, 3 votes; 15,000 to 20,000 tonnes, 4 votes; 20,000 to 30,000 tonnes, 5 votes; above 30,000 tonnes per annum, 1 vote for each further 15,000 tonnes, with a limit of 25 votes. Contributions are fixed at 0·08 fr. (8 c.) per tonne, with a limit of 20,000 frs. This budget will, it is believed, supply the funds for the current year, in addition to wiping-off last year's deficit of 1200 frs. Of the Syndicate's total expenditure during 1916, of 103,580 frs. (£4143), the chief items were: Salaries, 37,600 frs. (£1500); publications, circulars, &c., 24,840 frs. (£990); litigation, 9720 frs. (£388).

The question as to the price of gas despite standing contractual arrangements between a local authority and the holder of a concession has continued to engage the attention of the Syndicate. It is now just over a year since the judgment of the Conseil d'Etat was given in the case of the Bordeaux Gas Company. Its recognition of the nullifying effect of war conditions upon pre-war contracts has been usefully applied in dealing with organized opposition to increases in the price of gas—such as has been forthcoming, for example, from mayoral congresses at which the "pretensions" of gas companies was a species of battlecry. This movement gained strength from the issue in August last year of a circular of the Ministry of the Interior, and correspondingly checked the settlement of arrangements then in progress. But it is satisfactory to find that as the true facts have become known, good sense has prevailed, and that those who were foremost in crying-out at the rapacity of gas companies have one after another signified their assent to equitable terms. It is evident from the report that many forms of legal artifice have been resorted to in order to escape from the clear intention of the Bordeaux judgment. And M. Masse mentions, in an aside, certain obstinate municipal authorities who have themselves taken over the gas undertakings—when they have promptly raised the price of the gas themselves, examples which have not been without their good effect. It is anticipated that a further forthcoming judgment of the Conseil d'Etat will put matters in a more stable equilibrium; but, on the other hand, attempts are being made to introduce legislation whereby a gas company or other holder of a concession should submit to an inquisition into its profits during the whole period of the concession, and as a condition of increase of price, or claim to indemnity, should be required to show that the losses were such as to extinguish the previous total of profits, with other even more drastic provisions. But it was not likely the French Chamber would sanction such proposals.

Reviewing the coal question, which, next to that of the price of gas, is the chief cause of anxiety, the report attributes gas-makers' troubles to the mistakes made in estimating the nation's requirements, and the insufficient tonnage asked from England at a time when more could have been got if the necessity had been shown. Not enough regard was paid at the time to the need for replenishing stocks which perforce had been consumed, and to increasing the supplies to gas-works engaged in the national defence. Government action by way of taxation was slow, and lack of transport by sea and land had, during a specially severe winter, aggravated the other causes. The Government had at length sought to increase imports and home production, and to reduce consumption among private users by the adoption of "Summer Time," the earlier closing of shops, theatres, and other places; but shortage of coal, nevertheless, threatened some works with compulsory closing. Among all these difficulties, the Syndicate has incessantly kept the needs of the gas industry before the Government; and if its demands had not been met, it was on account of the total tonnage falling short of the estimated amount—an evil which would probably be intensified as time went on, owing to the greater difficulties of freightage. The requirements of gas undertakings as regards coaling vessels are now entrusted to a single organization—the "Gas Union of East, North, and North-West"—by which, it is hoped, some improvement will be made in the present most difficult conditions.

Stocks of coke had fallen from about 150,000 tonnes on Jan. 1, 1916, to 53,000 tonnes on Jan. 1 last; and the sale of the fuel for domestic purposes has had to be reduced to such a point, in fact, that the whole production of the gas-works is taken for war purposes or other branches of the national defence. The work of allocating supplies has been undertaken, as in 1915, by the Central Coke Committee.

The tar position has become somewhat better; distillers having agreed since Jan. 1 to the increased prices of 58 to 63 frs. per tonne—an advance of 7 frs. over those fixed in March, 1916, with a further 7 frs. for works on the Mediterranean, where the cost of coal is greater.

In looking to the future, M. Masse laid stress on the necessity of intimate association between every branch of the industry. They would all, he said, be faced with the same problems—lack of labour, the duty of restoring works in invaded territory, higher cost of living, and the restrictions which their patriotism laid upon them in their commercial relations with certain markets. He asked that they should give the future economic war all the thought and labour worthy of their country, and of those who had so nobly sacrificed themselves in its defence.

IMPERIAL CONTINENTAL GAS ASSOCIATION.

The Annual General Meeting of the Association was held last Tuesday, at the Cannon Street Hotel, London, E.C.—Sir Charles J. Jessel, Bart., in the chair.

The Secretary (Mr. R. W. Wilson) read the notice convening the meeting.

The First Annual Meeting.

The Chairman: Ladies and Gentlemen,—I do not propose to waste either your time or mine by explaining why I cannot to-day move the adoption of any report or accounts. This is the first annual meeting that we hold under our new Act of Parliament. We generally meet, as we do to-day, on the first Tuesday in May; but last year the Board purposely postponed the meeting to as late a date as May 24, in the hope that we should be able to announce to you that the Act had been passed. However, owing, not to the delay of the law, but to that of the Legislature, the Act did not finally obtain the King's Consent until a few days later—viz., the 1st of June. Since that time, I and my colleagues have had every reason to congratulate ourselves that we obtained the Act; and we have every reason to believe that its passing will be of benefit to the Association.

Vacancies in, and Absences from, the Directorate.

One of the provisions of the Act is that we are not under the necessity of filling up vacancies on the directorate until there are less than five Directors. Besides the vacancy that was created by the death of Sir Corbet Woodall (of which we knew at our last meeting), I regret to say there has been another removal from our number. Our youngest Director—Lord Gorell—who was a Major in command of a field battery of the Royal Artillery, was killed on Jan. 16. He was only elected a Director on Oct. 20, 1915; and necessarily, on account of his absence at the front, his attendances at our Directors' meetings were few and far between. It may be of interest to you to know that he last attended our Board meeting on Dec. 20, 1916; and only a few days previously he had received the D.S.O. at the hands of His Majesty. His friends—and I am glad to think they were many—felt that a career of great promise was thereby cut short; and the little we saw of Lord Gorell fully confirmed this view. He lived a clean, good life; and he died a noble death. A better epitaph no man could desire. Mr. Palmer was seriously wounded in June of last year. He has made excellent recovery, and is now doing light duty with his unit. But he could not get away to-day; and he desires me to apologize to you for his absence. Colonel Le Roy-Lewis is also absent; and he is doing good work in Paris as Military Attaché.

The Directors' Remuneration.

I should like now, for a moment, to speak on a subject of perhaps some delicacy—that of the Directors' remuneration. In pre-war days, when we paid income-tax, as we did in 1913, on a profit of £886,232, it was not a matter of much concern to the proprietors as to whether the Directors received £1000 or £2000 more or less. But "other times, other methods." And the £6000 a year that was paid to the Directors was voluntarily reduced by them at the outbreak of the war to £4500. On Sir Corbet Woodall's death, we took off another £500; and from Jan. 1 last, the £6000 will be £5000, subject to a reduction of 25 p.ct., which means a total of £3750 received by the Directors, instead of £6000.

The London Staff and the Country's Work.

Now I should like to say something about our London staff. At the outbreak of war, our staff consisted of nineteen men and two ladies. Two of our men, I am sorry to say, have been killed at the Front. One of these was a comparatively young man, named Bird, who, having enlisted as a private, gained a commission as 2nd Lieut. in the Bedfordshire Regiment. I should like to particularly lay stress on the other of these two men. His name was Bennett; and he had been in our service very nearly thirty years. By a pious and patriotic fraud

on the Recruiting Officer, though Bennett was 47 years old, he said he was only 37 years. In due course, he went out to the Front; and I regret to say he was killed on July 4 at the beginning of the battle of the Somme. Two of our officers, as I have before told you, Messrs. Gladwell and Williams, are doing good service in a Government office. Five others are soldiers; and one is engaged on munition work. Two were pensioned at the outbreak of the war, and two others retired on gratuities. This leaves five who are doing either work as special constables or are in the National Guard—of course, with the exception of Mr. Wilson, who also is doing good work; because it is through him that one of the men was able to go as a soldier at all. And he is doing and has done more.

MR. WILSON'S SERVICES.

Our accountant's branch was absolutely denuded of men; but Mr. Wilson, wishful for patriotic reasons to do his best, descended from his comfortable room and chair; and he is now to be found sitting in the accountant's office on a stool very much as he did when he first joined our service 45 years ago. [Applause.] But I have not done quite with Mr. Wilson yet, or his services to the Association. Some months ago, Mr. Joerger, our representative in Germany, particularly desired to meet Mr. Wilson to discuss with him the state of affairs in Berlin. He was to meet him in Amsterdam. Well, we were not particularly desirous to spare Mr. Wilson, and let him go through the dangers and discomforts of the voyage, and we thought our representative was fully aware of all we could tell him with respect to our views regarding our properties in Germany. Mr. Joerger, however, was very insistent that Mr. Wilson should go over; and so we obtained the leave of our Government for Mr. Wilson to go to Holland, and a passport was obtained for him. At the last moment, however, when it was thought we had said "good-bye" to him, some jack-in-office, at the Permit Office, sprang up and said, "No, it is not of the slightest national importance you should go over to Holland." And Mr. Wilson was stopped. In the meanwhile, I may say, the intensive submarine warfare began; and Dutch boats that used to go to Holland no longer ran. We appealed against the decision of the gentleman in the Permit Office; and our Government finally allowed Mr. Wilson to go; and we managed somehow to get him over to Holland in spite of the Germans and their submarines. I may say, to show what risks we ran, that the same boat in which Mr. Wilson went over to Holland was sunk only a few weeks afterwards. A friend of mine was on the boat when it was lost; and it was lost unfortunately with some casualties. After some days in Holland, Mr. Wilson was enabled to return. He was not torpedoed. But he spent four most uncomfortable days in the North Sea—all the more uncomfortable because the cargo was that of fish, and the fish went bad. Indebted as we are to Mr. Wilson—and I have no doubt one day after the war you will express your sense of this indebtedness—I am not sure he has not some claim upon us, under employers' liability, for considerable damage to his olfactory nerves. [Laughter.]

THE ASSOCIATION'S INTERESTS IN HOLLAND.

Now to go through our various interests on the Continent. First of all, I will take our only station that is still free from the enemy—Flushing. Coal has been dearer, and very scarce there; and working has been difficult. It is not, as I believe I have told you once before, a very great proposition. The finest year's profit we ever had at Flushing was only £3300; and last year we lost £7500 in serving it. We have had one little windfall from Holland. In 1889, when we still operated at Haarlem, and hoped the Municipality would not do as they did do—go in for gas-works of their own—we bought 22 acres of land in the neighbourhood of the town, and gave £5430 for it. We first sold 7 acres of it; and then the other day the rest of the 15 acres was sold. Our total receipts for the land amounted to £16,561; so we have had our money back at 5 p.ct. compound interest.

CONSIDERABLE INTERESTS IN FRANCE.

I will now detain you for a few minutes by talking about our interests in France, which are very large. I think the proprietors are unaware of what very considerable interests we have there. These interests are in the nature of investments; and we have not any separate stations controlled entirely from London. Our principal interests lie in the town of Lille. One of the Companies (the Compagnie Continentale du Gaz) in which the Association holds the whole of the share capital of 10,000,000 frs., which is practically £400,000, besides the other towns, supplies the portion of the town of Lille which was formerly served by the Association. Our interests in this Company cost in sterling £367,088, and stand in our books at £356,601. In the other big gas company that furnishes gas to the rest of Lille and its suburbs—the Wazemmes Gas Company—we hold 17,236 125 fr. shares, out of 28,000. These shares cost in sterling £350,300, and stand in our books at £210,009. Besides shares in this Company, we hold 1923 500 fr. 4 p.ct. obligations, which cost £38,201, and have a book-value of £37,726. There is also the Société Lilloise d'Eclairage Electrique, in which we have 600 4½ p.ct. obligations of 500 frs. each, which cost in sterling £11,904, and have a book-value of £11,675. We have also in the same Company 7000 obligations of 4½ p.ct. of the same denomination, which cost £138,862, and stand in our books at £131,091. Besides the obligations, we also possess 1019 fully-paid 500 fr. shares, which cost £19,980, and stand in our books at £4418, and 2038 50 p.ct. paid shares, which cost £20,351, and stand in our books at £4075. In the Nancy Gas Company, which, in addition to the town of Nancy, supplies St. Dié and owns the majority of the shares in the Pont-à-Mousson and Toul Gas Companies, we hold 2576 4 p.ct. obligations of 500 frs. each, which cost and have a book value of £41,672. We also hold 689 shares of 500 frs. each, which cost £139,466, and which stand in our books at £83,578. The total cost of all these investments amounts to £1,127,828; and the book value to £881,249. I have given you these figures because I think you have never been able to glean them from any report or balance-sheet circulated up to date; and I think it right that you should know the character of your investments in France, and what value they represent.

DIFFICULTIES IN FRANCE.

Now, of course, so far as Lille—the most important town—is concerned, we only know from the latest news which came through from Paris that things were going well; but what will be the fate of Lille when the Germans leave it, I will not prophesy. There have been great difficulties in supplying the towns in France with coal. At Cholet coal has been costing £4 per ton in wagon, and one or two little places have already had to close-down for want of coal. Nancy has also been hard pressed for coal, and has received some nasty attentions from the enemy by way of long-distance guns, and bombs have been dropped upon it from aeroplanes. In the town of Pont-à-Mousson (the Nancy Gas Company holds the bulk of the shares), the gas-works have long ago been out of action by shell fire; and the town has been continually and continuously bombarded.

IN BELGIUM AND AUSTRIA-HUNGARY.

With respect to Belgium, I can only say that, to the best of our knowledge and belief, things are going on well both in Brussels and in Antwerp. Of our Austro-Hungarian interests I have no news whatever to give you.

THE ASSOCIATION'S CLAIMS AGAINST THE CENTRAL POWERS.

Under date of June 3, 1916, the Director, Foreign Claims Office, Foreign Office, wrote to the Association as follows:

> I have to inform you that it appears from a notice issued in the Deutsche Reichsanzeiger of the 22nd May, 1916, that the Imperial Continental Gas Association, London, in Germany, branches in Berlin, has been placed under compulsory administration. This Office has been constituted for the purpose of dealing with claims by British subjects against enemy Governments: and your Company should, accordingly, register a claim here against the German Government for the sequestration of its property, in accordance with the enclosed instructions.

The claims which were then confined to the Association's establishments in Germany were carefully prepared and, with a statutory declaration by the Secretary, were lodged with the Foreign Claims Office on June 8. They amounted at that time to £11,251,660. Since then there has been the dividends which have accrued, and the interest on our Frankfort money. But the claims have not yet been amended, as, of course, our knowledge of the actual situation is not sufficiently accurate. Then, on June 9, the Director of the Foreign Claims Office, *inter alia*, remarked:

> I observe from your letter that your Association's establishments in Belgium have also been placed under compulsory administration by the German authorities. If this be so, the Association should register in this Office a claim against the German Government for the sequestration of its property in Belgium.

We accordingly registered our claims in regard to the Association's assets in Belgium. They amounted to £3,226,933. The Belgian and German claims together amounted to £14,478,593. Then having learned that the Austrian Government Commissioner was offering for sale the Association's works in Bohemia, we wrote to the Foreign Claims Office informing them of this, and asking whether the Association should not also register a claim against the Austrian Government with regard to the Association's assets in Austria-Hungary. Under date of June 20, 1916, we were authorized to do this; and accordingly registered our claims on this account, amounting to £1,235,355. Our total claims against the Central Powers amounted in June last to £15,713,948. Under date of June 17, 1916, the Association was informed by its German representative, by permission of the German Government, that—

> The Compulsory Administration Order was issued on May 15 by the Royal Prussian Minister for Commerce and Trade; and Mr. Town Councillor Cassirer, who hitherto had been State Supervisor, is now appointed Compulsory Administrator. In consequence, it is only now possible for me to communicate with you and give you particulars. The Compulsory Administration Order has been issued as a reprisal to the liquidation of German firms by the English Government, and especially as an answer to your Government's harsher decrees against German trade. In consequence of this measure, it cannot be foreseen what fate may be in store for your German establishments, which hitherto could be conducted in a normal manner, entirely unrestricted.

LIQUIDATION IN GERMANY.

All the above refers to compulsory administration; but now another phase occurs in the affairs of the Association. On July 31, 1916, the Bundesrat, or Federal Council, issued a decree empowering the Imperial Chancellor to order the liquidation of such undertakings, the capital of which is held preponderantly by British subjects, or which are controlled or managed from British territory. British interests in any undertaking may also be compulsorily liquidated; the decision of the Imperial Chancellor that grounds exist for the order of liquidation being final. Then I read what I think are three clauses in the decree which are of particular interest:

(1) The liquidation will be carried out by a liquidator appointed by the Provincial Central Authorities; and he will take legally and fully the place of the proprietors of the undertaking for the British interests.
(2) The liquidator may sell the undertaking as a whole. He can sell the British interests in such undertaking; or, if it be a question of a company (public trading company), partnership company, or limited liability company, he may give notice of liquidation without being bound either as to date or term.
(3) The results of such liquidation, from which first of all the costs of liquidation are to be covered, will, so far as they belong to British subjects, be placed on deposit.

Well, as late as February last, no steps had been taken under this decree. Then we have this dated from Berlin, March 27, 1917, from the Town Councillor Max Cassirer-Charlottenburg, Liquidator:

> Liquidation of the English Gas-Works in Greater Berlin belonging to the Imperial Continental Gas Association in London, including the Oberspree Gas-Works, Limited Liability Company, and the Gas-Works at Grünau, Joint-Stock Company.
>
> Inasmuch as the Imperial Chancellor has ordered the liquidation of the Imperial Continental Gas Association by way of sale of the undertaking, I beg all interested to send me in their offers for the acquisition of the works by the 15th of May following.
>
> The conditions of sale, as well as all information regarding the results of the business and the valuation of the plant, can be obtained from us.
>
> A decision with regard to the ultimate price to be accepted is reserved.

PROSPECTIVE SEVERANCE OF CONNECTION WITH BERLIN.

I need hardly explain to you that, of course, the word "liquidation" does not mean "confiscation." We cannot do any more than we have done. We have lodged our claims; and we look to our Government to protect us against anything like a sale at a ridiculous price. I do not for one moment think that the Germans intend our property to be sold at a ridiculous price. On the contrary, their interest is (they take the money for the time being) to get the very best price for an English undertaking over there; and, besides, they are fully aware and believe that the amount of German property in England is considerable, and that it would be always possible and probable that compensation would be granted to people in like case to ourselves who were unfairly treated by any forced sale of that nature. In any case, I believe, before I have the pleasure of meeting you again, the long connection—a connection of over ninety years—that has existed between this Association and Berlin will be severed. Since 1889, when we lost our contract for the nine inner districts of Vienna, Berlin has been the very backbone of the Association.

GOOD SERVICE IN BERLIN.

There is one point which I should like to emphasize—that is, that on the whole, in spite of the war, very little animosity has been shown towards us in Berlin. I cannot help thinking that this is due to the methods we have followed in conducting our business. I do not for this lay any claim to credit on behalf of my present colleagues and myself. These were the methods when I joined the Board over twenty years ago; and all the merit we can claim is that, with respect to these traditions, we adhered to them. I know that public utility companies even in their own country, when carried on, controlled, and financed by their own nationals, are not, as a rule, the objects of very much popularity. Therefore I think we can claim it as a feather in our cap that, if we are not very popular, at all events we are not very much disliked. There is one other point I should like to make. I know it is a little difficult for anybody to think kindly of any members of the German nation. I know that. But I do think—and you need not associate yourself with this—my best thanks are due to men like Mr. Joerger and Mr. Korting, and all our staff at Berlin (never mind to what nationality they belong) for their loyal and good service both in times of peace and war, and latterly in times of great anxiety and difficulty. [Applause.]

INCOME-TAX.

I have now gone through most of what I had to tell you with respect to foreign parts; and I should just like to say a word or two about the state of affairs at home. In October last we received our assessment paper for the year 1916-17. Evidently the Inland Revenue does not know that there is a war going on. The assessment was based on a profit of £800,000; and they kindly asked us to pay £200,000 duty. [Laughter.] When things were explained to them, we were let off with the payment of income-tax on our debenture stock, less the tax on investments at the source. The net payment was £2266, which is an improvement on the £50,000 paid last year. It may interest you to know that the Association has paid in income-tax since the war began £109,427, which is not a bad sum for us who have not received anything since the beginning of the first half of 1914.

FINANCIAL POSITION AT HOME.

Our financial position at home remains thus: On April 30 (yesterday), we had in Treasury bills, loans to brokers, and bank balances, £188,500; in saleable securities other than reserve fund, £423,150; and the reserve fund (which consists of £300,000 Consols, £100,000 4 p.ct. war loan, and £105,300 5 p.ct. war loan) is worth at present prices £362,000. So that we have still left at home £973,650. Now I think I have travelled sufficiently over your various interests and properties; and I will put myself in order by moving that the common seal be affixed to the Register of Proprietors.

The DEPUTY-CHAIRMAN (Mr. Arthur Lucas) seconded the motion.

Mr. W. S. CUTLER asked, with regard to the claims put forward by the Association, whether the Board of Trade accepted the figures, or was there likely to be any difference of opinion as to the value of the claim.

The CHAIRMAN: The Foreign Claims Office has accepted them.

Mr. CUTLER also inquired whether it was the impression of the Board that the 15 millions would be obtained?

The CHAIRMAN: All sorts of questions may arise. We have translated the mark at 20·52, which was the rate of exchange at the outbreak of war. What the value of the mark will be at the end, no one can say. The payment would naturally be in marks.

Mr. CUTLER: Then you told us Mr. Wilson had an interview with Mr. Joerger in Holland. Can you tell us something about that interview?

The CHAIRMAN: There were no secrets about it. It was only a discussion over the methods and manner of getting over certain small difficulties.

Mr. CUTLER further remarked that the debentures were redeemable at 105 Would they be redeemed *pro ratâ* according to the sum of money received from the liquidation of the property in Germany and Austria?

The CHAIRMAN: In our new Act, it was clearly stated that for every £100 of ordinary capital stock which was paid off, 25 p.ct. of debenture stock would be paid off at £105.

Mr. R. W. HARPER: Did your claim include the Frankfort works?

The CHAIRMAN: All our assets in Germany.

Mr. HARPER: What was the amount?

The CHAIRMAN: It was between £900,000 and £1,000,000 sterling. The town of Frankfort has not to pay until six months after the declaration of peace.

The motion was unanimously carried.

RE-ELECTION OF DIRECTORS AND AUDITORS.

Moved by the CHAIRMAN, and seconded by the DEPUTY-CHAIRMAN, Sir Henry Birchenough, K.C.M.G., was re-elected to his seat at the Board; and proposed separately by the CHAIRMAN, and seconded by Sir HENRY BIRCHENOUGH, Mr. Hugh Goodwin Newton and Colonel H. E. Le Roy-Lewis, C.B., were also re-elected.

Moved by Mr. BERNARD F. HARRIS, and seconded by Mr. GILES T. PILCHER, the retiring Auditor (Mr. C. F. Dendy Marshall, M.A.) was re-appointed.

This concluded the interesting proceedings.

PRIMITIVA GAS COMPANY OF BUENOS AIRES, LTD.

The Annual General Meeting of the Company was held last Tuesday, at River Plate House, Finsbury Circus, E.C.—Mr. A. E. BOWEN in the chair.

The SECRETARY (Mr. J. M. Macmorran) read the notice calling the meeting; and the Directors' report and the accounts were taken as read.

A DISASTROUS YEAR.

The CHAIRMAN, in moving the adoption of the report and accounts, said they had had a disastrous year. It was no use mincing matters, as there was hardly one bright spot in the whole of the business. When the shareholders met last year, he had a very bad story to tell; but, although he then explained that the outlook was bad, he hardly anticipated it could possibly result in 1916 in a loss of £25,000, after paying debenture interest and fixed charges. But such was the case; and the position was even worse than that, because, for the last two years, they had not been able to contribute anything to the Retiro amortization account, so they had this £70,000 to the bad also. The falling-off in the profits—£111,797—was more than accounted for by the increased cost of coal, £75,729: and the decreased sales of coke, £76,049—making together £151,778. But by very strenuous efforts their friends in Buenos Ayres succeeded in cutting-down the costs of manufacture by £11,606, distribution by £24,110, and bad debts by £5857. These and other small items of economies made up the difference; so that the net decrease in the profits was £111,797. The General Manager in his yearly report said:

> On practically every item over which we have control, the cost per unit of gas sold has been reduced; but with the terrible increase in the cost of crude materials, our saving is of but little avail. In considering the results of the year's working, which are, to say the least, disastrous, I trust that it will be understood that everything possible has been done, or tried to be done, to effect economy within the works, administration, and district offices of the Company. During the year, a considerable amount of money has again been spent in the up-keep and repairs of mains, services, meters and cookers, buildings and plant generally, in order that they should be maintained in an efficient manner, with the result that the whole of the plant, machinery, buildings, &c., to-day are in thorough repair and first-class working condition.

COKE AND COAL—TRIALS WITH OTHER RAW MATERIALS.

The principal falling-off in the gross revenue was in sales of coke, which were reduced from 60,500 tons in 1915 to 19,000 tons in 1916; making a difference in the receipts of £76,049. But, of course, without coal they could not get coke or raw material for the chemical factory; and the pity of it was that coke was exceedingly scarce in Buenos Aires, and commanded a price of about £7 per ton. For the reasons which he gave last year, they were unable to get anything like sufficicient coals either from England or the States; so that they were able to carbonize only 68,400 tons in 1916—a falling-off of 62,000 tons from the previous very bad year. With regard to this question, he would read what the General Manager said in his report about the way they had been able to carry-on, in face of their difficulties:

> During the past year, the search of ways and means to obtain crude materials for the production of gas at a reasonable price has been indeed a serious matter; and although we have carried out large experiments with some dozens of different classes of timber, oil, peats, graphite, and native coal from the provinces of San Juan, Catamarca, and even Tucumán, I regret to say that up to the present time we have found nothing that can be termed satisfactory when compared with gas coal. Quebracho blanco [a hard wood] has, on the whole, proved the cheapest and the most advantageous for our purpose that we have tried; and, although the residuals obtained are practically *nil*, the yield and quality of the gas is superior to any of the other substitutes. The coal from San Juan, Catamarca, and Tucumán consists of graphite, and is all more or less the same class—in fact, it is not coal, but chiefly a form of pitch with a petroleum base possibly formed by volcanic eruptions; and although gas can be produced from this material, the residue left in the retorts consists of a semi-liquid mass which sticks to all classes of tools, and, in consequence, is very difficult to handle.

He might add that during the year 4540 tons of oil and 55,000 tons of hard wood were carbonized—the actual net cost of the gas manufactured being 62 p.ct. higher than in 1915, which meant an increased total cost of £132,000. For the gas sold 7·59 p.ct. less was collected than in 1915, although the output was only 4·12 p.ct. less. This was accounted for by the fact that, although they gained many new customers who consumed gas for heating and cooking, owing to the high cost and scarcity of house coal, they had at the same time lost a considerable number, who had installed electric lighting in place of gas; and as the fixed selling price of gas for heating was 5 c. per cubic metre less than for private lighting, they got the result he had just given. He was, however, glad to say that, from all appearances, they had now reached the turning-point with respect to the quantity of gas sold, and also the gas-rental obtained, as during the past three months the quantity sold and the net income had both shown an increase, when compared with the corresponding period of the previous year.

THE POSITION WITH THE MUNICIPALITY.

Referring next to the Company's relations with the Municipality, he quoted the following from the General Manager's report:

> I would like to put on record that, although every effort was made by us during the first ten months of the past year to get the late Intendente, Dr. Gramajo, and his Municipal Council, to consent to our petition to be allowed to increase the selling price of gas, decrease the calorific

> value while using wood, and pay our accounts, I regret to say that in every instance, we failed. For some unknown reasons, Dr. Gramajo would not assist the Company in any way, although we only asked for the same conditions as granted to our competitors, the German Electricity Company. Although the whole matter was on more than one occasion practically settled, either Dr. Gramajo, or his Secretary, always backed-out on one pretence or other, at the last moment. They would not even recognize the shortage of coal and the consequent use of any substitute as *force majeure*, and maintained that for the Company to use anything but coal is a breach of contract, and they fined us accordingly. Since the installation of the new Lord Mayor, I am glad to say that matters have improved, and from all appearance, the final report of the new Chief of Alumbrado Publico [Public Lighting] will be presented during the incoming week, when the whole matter will then be placed before the Municipal Council along with the recommendation of the Lord Mayor, who, I venture to think, is favourably disposed towards the Company.

He (the Chairman) could confirm every word of this, especially as they had had the pleasure of conferring with their colleague, Mr. Charles Lockwood, a member of the Local Committee, who paid a short visit to England last December. They exhausted every possible means of coming to terms with the authorities. They begged, prayed, threatened to a certain extent, and eventually, as mentioned by him last year, obtained promissory notes for a million dollars in part payment of their accounts for public lighting. But these bills were dishonoured; and the Directors were obliged to protest them, and take action. They had two entirely different questions with the Municipality. They had a concession for twenty years from 1910 to supply gas to the city—practically a monopoly; and at the time they made the contract, although they did not foresee this horrible war, they endeavoured, by every means in their power, to provide for a sliding-scale of selling prices, based on the cost price of coal into the works. But they did not succeed, and had to take the only conditions they could obtain. There was, however, in the contract an arbitration clause; and under it they appealed to the authorities to recognize that the European war made their case one of *force majeure*, and that they should consequently be granted a sliding-scale, if only for the duration of the war. The late Lord Mayor would do nothing, although the Company placed their books at his disposal. He had them examined, and knew also that almost every authority in the world had given the right to its gas contractors to raise prices—in some places to the extent of 50 p.ct. So the Board were obliged to appeal to the Courts; and the matter was still *sub judice* until a few days after the report was issued, when they received a cable telling them that the law suits had been amicably settled. For the public lighting they had a separate contract, by which they undertook to light up to 20,000 street lamps at a fixed charge per month; the Municipality on their part undertaking to pay the accounts monthly as rendered. They had not complied with this condition, with the result that, at the end of 1916, the amount owing was no less than £225,816, and the debt increased at the rate of about £12,000 per month. The Company were compelled to carry-on, if it were at all possible, by the fact that the then Lord Mayor told the Board plainly that, if he got a chance, he would cancel the contract, as he had arranged with the German Electricity Company to take over the street lighting at once. Personally, he (the Chairman) did not think the Lord Mayor would do this, as he knew that he himself had already broken the contract by neglecting to pay the accounts for more than two years, while at the same time compelling the Company to pay into the municipal treasury the 10 p.ct. tax on the lighting in accordance with the contract. The Board had no doubt whatever that the Germans had been the principal causes of their troubles with the late Lord Mayor and his officials. Why it should be so he did not know. He had heard it said that the Company's representatives' methods with the officials had not been conducive to a good understanding with the Municipal authorities. There was not the least foundation for this. The Chairman of their Local Committee (Mr. Samuel Hale Pearson) was an Argentine gentleman of great ability, and occupied some of the highest positions in the country. Mr. Angus was a first-rate gas manager, and as such was very much respected by the authorities; and he was naturally always anxious to be on good terms with them.

PART OF THE DEBT LIQUIDATED.

However, the position as to the municipal debt had changed since the report was issued. They had received £40,000 from Buenos Aires, and had advices that the Municipality had paid the Company £100,000—this £40,000 being part of it. The £100,000 was the equivalent of the protested bills; but they had still owing about £160,000. This collection only helped to carry-on—it did not help the profit and loss account, because they took the municipal debt into the present accounts as a good asset.

THE ACCOUNTS.

The Chairman proceeded to review the accounts. In doing so, he stated that coal delivered into the works in 1915 cost £2 2s. per ton; while last year the cost was £3 4s. 5d. This latter figure showed an increase over 1913 of no less than £1 10s. 5d. per ton. The cost so far this year showed a further increase of £1 3s. per ton. With reference to the income-tax item of £29,516, the Directors had, of course, been obliged to take into account the amount which the Inland Revenue had demanded on the basis of the usual three years' average. But they had appealed to the Commissioners for relief under the second Finance Act of 1914; and they expected to obtain a very considerable abatement.

FUTURE PROSPECTS—A WELCOME CABLE.

As to the future, the Chairman said unless the authorities would consent to the Company charging some part of the extra cost of gas to the consumer, and of that, so far, there was no sign, the position this time next year would be worse than it was that day. What little coal they had been able to get out this year had cost £4 7s. 6d. per ton. Freights were almost unobtainable from the United Kingdom; the last charter being at the rate of 92s. 6d. per ton—the record price. A few boats had been offered and snapped-up at anything up to 120s. per ton from the States. It might well be that they would not be able to get out any more coal at any price. He did not hope for any improvement in the coal position until after peace was declared; and for some time afterwards things were bound to be difficult. Of course, they had to realize that the Municipality had many troubles to contend with—including monetary difficulties since war was declared. The Company's grievance, however, was that they had had the German Electricity Company held over their heads all the time, as being willing and able to take over the municipal contract if they were obliged, owing to the non-payment of their accounts and consequent lack of money, to stop lighting the public lamps. This was unfair; and after serving the community well and faithfully for fifty years, it seemed inexplicable that they should not have been permitted, in an extremity caused entirely by the war, to increase their charges for gas, even to a small extent, while the German Company were allowed to increase theirs in accordance with the cost of coals. Personally, he was deeply sorry that the affairs of the Company should have developed into almost a public scandal; and he feared very much that the treatment meted out to them had done the capital and the country a lot of harm among investors both in England and the United States. [Hear, hear.] He could only hope that the new *régime* would see matters in a fairer spirit; and the Company, on their part, would continue to do everything in their power to serve the city faithfully, and to keep on the usual good terms with the authorities. Mr. Pearson had cabled them that the new Lord Mayor and his officials were disposed to treat the Company fairly, and that he had every hope of being able to arrive at a settlement of their troubles very shortly. A cable received from the Local Committee the previous day stated:

> Present Lord Mayor, notwithstanding opinions of ex-Lord Mayor and legal advisers, has terminated law suits initiated by ex-administration against our Company for non-payment tax. Has paid outstanding treasury bills with interest amounting to £100,000, which we have received, and we are confident shall receive early next week another £50,000 corresponding to taxes deposited under protest which are being returned to Company as part payment of accounts. We have great hopes of obtaining shortly collection of balance of gas accounts, also of arriving equitable arrangement increase price gas and modification contract.

If this came out right, the Chairman added, the Company would be in a very different position next year.

Mr. H. E. JONES said it was his melancholy duty to second the resolution, involving as it did the unfortunate history which the Chairman had given them. Many European gas companies had been labouring under the war cloud, like this Company, during the past two and more years; but from an intimate knowledge of a good many of them, he was able to tell the shareholders that in no case had they been submitted either to the misfortune of not having their price of gas revised or of being kept out of moneys due to them. The feature of the Argentine struggle—it had been a hard struggle for the Chairman and Board—had been the entire unwillingness on the part of the authorities to submit to a fair consideration of the broad circumstance which had been stated by the Chairman—that the price of coal in 1916 had gone up to £3 4s. 5d. per ton. The proprietors would realize that to sell gas when coal was costing such a figure at the same price as when coal cost about 30s. per ton was an economic impossibility. There was the further question of the Municipality withholding moneys. But while the war did deprive the Company of profit for the time being, there remained this great city of Buenos Aires, with its large agricultural wealth outside, and its considerable wealth in the banks. When the war had passed away, the Company would again come into its own. It was an enormous city—a city for a large and increasing sale of gaseous fuel; and he had observed with very great content that, although the electric light took away some of the illumination, the business of heating by gas advanced steadily. At the lower price at which they undertook in their concession to sell gas for heating, there was profit on that.

There were a few remarks from Mr. SKEEL, Mr. A. T. EASTMAN, and others, all of whom heartily sympathized with the Board and the local management.

The motion was unanimously adopted.

The retiring Directors—Messrs. A. E. Bowen, C. P. Ogilvie, and Ross Pinsent—were all re-elected; and Messrs. George A. Touche & Co. were re-appointed Auditors.

THE DIFFICULTIES OF SHIPMENT.

A hearty vote of thanks having been passed to the Chairman and Directors,

The CHAIRMAN acknowledged it, and then moved a cordial vote of thanks to the staffs in London and Buenos Aires. If, he remarked, the staffs had had as worrying a time as the Directors had had—and he knew it to be the case—the shareholders could be sorry for them. It was heart-breaking to feel every day that nothing could be done to improve the position of the Company. Here in London the officials had to sit and suffer, as it took days, and sometimes weeks, of work to get even the smallest shipments away. He might just cite as an example the last small cargo of coals they got away. They managed to get a neutral ship chartered, and to obtain a licence for her, after a lot of work. Then they had permission to buy and ship the coal, and, when the ship was about loaded, they were told she would be commandeered, as one of the Allies was in urgent need of gas coal, and must have the cargo. However, at last, after endless trouble, they succeeded in persuading the authorities that it was vital to the Company's interests to have the cargo, and they then got the ship away. Whether she would reach Buenos Aires was another story. And what should he say about their Buenos Aires Manager—Mr. Angus—who had had to bear most of the heat of the day? It was marvellous that he had been able to keep up an adequate supply of gas, while at the same time bringing down his fixed and other charges to figures which the Board thought almost impossible. In the vote, he included the Local Committee.

Mr. H. P. NORRIS seconded the motion, which was heartily passed.

The London County Council have settled at £2806, with interest and legal costs, their claim against the Wandsworth, Wimbledon, and Epsom District Gas Company in respect of the damage caused to Battersea Bridge by the s.s. "Wandle" in July, 1915.

EXAMINATIONS IN "GAS ENGINEERING."

City and Guilds of London Question Paper.

The following were the questions put to candidates last Saturday week in the examination in "Gas Engineering," held under the auspices of the City and Guilds of London Institute. The Examiner was Mr. Samuel Glover, of St. Helens. Candidates were directed to confine themselves to one grade only, and not attempt to answer more than eight questions in the four hours allowed. The maximum number of marks obtainable is appended to each question.

GRADE I.

1. Sketch to scale as near as possible a half-length longitudinal view from mouthpiece inwards of a modern regenerative setting of seven retorts above the ground line, showing the spacing and thickness of the supporting walls and combustion chamber and one cross-section of same, showing by arrows the circulation of heating gases. [45 *marks.*]

2. Show by a sketch and brief description a section of a hydraulic main of which you approve, with short connections attached, and state in what particulars a dry main differs from this. [40.]

3. In order to obtain the best results per ton of coal carbonized, what is the most suitable temperature to maintain in the setting with six-hour charges? State the results you would expect to obtain, naming the class of coals which you have assumed. [35.]

4. What improvements or new methods have recently been introduced into the construction and working of carburetted water-gas plants? [40.]

5. Give the various methods of gas condensation. At which points in the process is it best to remove the condensates from contact with the gas? [35.]

6. What are the best materials to use in carrying-out the process of purification of coal gas, and how is the most thorough contact between the material and the gas best maintained during the working-up to the right percentage of sulphur in the material? State the main chemical reactions involved in the process you describe. [40.]

7. Describe a recording pressure-gauge with which you are acquainted, and state the physical influences under which it works (*a*) above zero, (*b*) below zero, and give the relationship between pressure in head of water in inches, mercury in inches, and a pressure of 1 lb. per square inch. [35.]

8. State briefly what is the process known as the stripping of gas as carried out in gas-works, and its effect on the gas supplied to consumers. [35.]

9. Describe by means of sketches a station governor and a district governor, and state where they are generally fixed and how they are controlled. [30.]

10. Draw (*a*) a front view of a station meter in a rectangular case, showing the position of index and gauges, (*b*) a sectional elevation of same, showing how the drum-shaft is supported and the position of the inlet and outlet pipes. [35.]

FINAL EXAMINATION.

1. Draw a longitudinal view of a setting of eight retorts, stating size of retorts. Show section of producer, and state if only one is used for through bed, and give area of grate. Show position of main flue and connection thereto. Give the working temperature of (*a*) setting, (*b*) secondary air, (*c*) waste gases. [45 *marks.*]

2. State the results which should be obtained per ton of a specified quality of coal from a setting of the above description, in gas, tar, liquor, and other products; give also the quality and chemical analysis of the gas. [45].

3. State what is included in the process of the purification of coal gas and the chemical changes brought about by the process you describe. [40.]

4. What are the hydrocarbons which are employed in the carburation of carburetted water gas? State (*a*) how they are tested, (*b*) the quality which is most generally used, (*c*) the effect on the gas made of the quality of the hydrocarbons used. [40].

5. Describe a useful and reliable pyrometer as used in gas-works, and a calorimeter in common use for testing the calorific value of the gas. State the effect on the calorific value of (*a*) an admixture of 5 p.ct. of furnace gases, and (*b*) of 20 p.ct. of uncarburetted water gas. [35.]

6. Plot in simple outline a scheme of works suitable for the production of 5 million cubic feet of gas per day. State the method of manufacture you would adopt to meet the needs of a district, the peculiar demands of which you must specify. [45.]

7. What are the products derived from the treatment of ammoniacal liquor on gas-works? State the various materials required in detail; and say how the standard qualities of the products are generally specified, and give their chemical analyses. [35.]

8. Describe a gasholder flying lift, and the size and construction of a floating body to which such a lift may be most suitably adapted. Sketch sufficient of one line of guide and rollers to show clearly how such a lift is truly and safely guided. [35.]

9. Sketch, in simple outline, a plant for the partial stripping of gas for the recovery of supplementary hydrocarbons in addition to those produced from gas tar. What are the hydrocarbons so recovered, and what effect has their removal from the gas upon the illuminating power, flame temperature, and calorific value of the gas so treated? [35.]

10. State the cycle of operations in two different types of gas-engines of modern construction, compare (give figures) the running costs of a 50 H.P. gas-engine with those of an electric motor of similar power, and state for what purposes the two different sources of power are most successfully and economically applied. [30.]

The Leeds Food Control Compaign Committee are asking the Corporation for a reduction in the price of gas supplied to communal kitchens.

WRIGHT'S FURNACES

for MELTING, ANNEALING, &c.

OVEN FURNACES Gas or Coke Fired.

Made to any size, for any heat treatment of metal, &c.

CRUCIBLE FURNACES Gas-Heated.

Tilting and Stationary Types for Melting Brass, Copper, Cupro-Nickel, &c.

Can be seen in operation at the Furnace Demonstration Room of

THE MANCHESTER CORPORATION GAS DEPARTMENT, 15, Whitworth Street West, MANCHESTER.

Demonstrations held daily until May 25th from 10 a.m. to 4 p.m. (Saturdays excepted).

JOHN WRIGHT & CO.,

Essex Works, BIRMINGHAM.

Wright's "Lip-Axis" Crucible Furnace.

USE OF GAS FOR FURNACES.

The demonstrations of metal melting, hardening of high-speed steel, annealing, &c., which have during the past fortnight been given daily (and will continue until the end of this week) in the special demonstration shop of the Gas Light and Coke Company at Goswell Road, have resulted in some good business being done. As was pointed out in the "JOURNAL" a fortnight ago, the Company have arranged to place the shop at the disposal in turn of the leading firms engaged in the manufacture of furnaces and similar apparatus for the use of gas; and the present exhibition, which is the first of the series, has been arranged by Messrs. John Wright & Co., of Aston, Birmingham, who must be gratified at the success which has attended their efforts. On the opening day, a lecture [*ante*, p. 134] was delivered by Mr. Shipley N. Brayshaw, in which were brought out a number of points of interest to just those whom the demonstrations are intended to assist.

How Requirements are Met.

Mr. E. RUSSELL BRAYSHAW (the Managing Director of Brayshaw Furnaces and Tools, Limited) followed this up by a similar lecture on Wednesday last, in the course of which many practical matters in connection with gas-furnaces were emphasized.

In a few opening remarks leading up to the latest types of furnace his firm have evolved, he said that they approached the problem of gas burning as furnace users. As tool makers, it was essential for them to obtain three things—high temperatures, a non-oxidizing effect, and as small a gas consumption as possible. From the very first, it seemed that this resolved itself into the need of getting an intimate mixture of the gas and air; and while this might appear a very simple problem on the face of it, it was not by any means always easily secured. Diagrams were displayed on the wall, to give an idea of the successive stages of development of the firm's burners. The first burner, he explained, worked with air at 1 lb. pressure; and with this there was obtained what was now known as surface combustion. This burner did not do badly, and gave a fairly intimate mixture of gas and air. It was, however, open to the objections that gauze was employed, and that there was much resultant noise; and so they went on to the designing of a burner having an injector action. This was an attempt to secure an intimate mixture of gas and air such as had never been known before. It rendered possible the use of very high temperatures, and gave results, as far as non-oxidizing effect and economy of fuel were concerned, which they had not previously equalled. The noise, too, was very slight; and this made a big difference when working in large batteries.

The burner just referred to, continued Mr. Brayshaw, was adopted at the Royal Mint. At one time all the melting there had been done by coke; and Mr. W. J. Hocking, in a paper which he recently read before the Institute of Metals, gave a comparison between a year's working with coke and one with gas. In 1909, it was all coke melting, and in 1913 it was all gas melting. The quantity of metal melted in the former year, he believed, was about 1300 tons of gold, silver, nickel bronze, and probably a certain amount of pure nickel. In 1913, there were melted 2000 tons. The comparison given was:

Rate per Ton in Shillings.

	Fuel.	Crucibles.	Wages.	Total.
1909 . . .	24·29	42·09	15·68	82·06
1913 . . .	22·09	26·69	10·84	59·62

These figures were not the result of a limited test, but were over the year's working, taking the good with the bad; and it would be agreed that they showed an economy which was well worth consideration. The total figures were high for gas as well as coke; but it was a comparative test, and it was one which, the more it was looked into, the better it would bear examination.

The "Lopress" Regenerative Furnace.

The principle of breaking-up the gas and air, and very intimately mixing it, which was adopted in the burner he had been referring to, was in extensive use. Really, it resulted in more than giving an intimate mixture. It was the difference, if he might say so, between a "live mixture" and a "dead mixture." The firm's experiments led them from this to see what they could do with lower pressures of air. Hitherto, they had been working with 10 lbs. and 5 lbs. of air pressure; and they felt rather proud when they got down to melting pure nickel at 1 lb. pressure. But even this meant the installation of a positive blower. If he were confronted with the problem whether to compress gas or air, he would prefer to compress the larger volume of air to 1 lb., than the smaller volume of gas to 10 or 11 lbs., which was the equivalent. By their latest development, however, they had been able to reach the high temperatures required with air at only a very few ounces pressure—say, 4 in. water-gauge—supplied by means of a cheap fan. As a matter of fact, as regarded temperatures and non-oxidizing effect, they had got results with the low-pressure furnace for which they previously required air at 1 lb. pressure. Mr. Brayshaw then proceeded to describe the "Lopress" regenerative furnace, and to point out its chief features—*i.e.*, the primary air is at atmospheric pressure, the secondary being supplied by the fan; and the action is truly regenerative, as distinguished from pre-heating by a cold air jacketing arrangement. The utilization of waste heat, he said, was a matter that appealed to everybody; but it was an expression which was frequently very loosely used. In fact, furnaces were sometimes called regenerative which were not regenerative at all. The whole question of regeneration was complicated; and it did not necessarily follow that it would pay to go beyond a certain point in this direction. So far as he could see, there was a great deal to be found out yet. It

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was a tempting problem to many people; and his firm received numerous suggestions whereby they ought to get more out of the gas at the end than it had in it at the beginning. There were limits to the usefulness of the regenerative principle.

He proceeded to quote a letter from a manufacturer who was using one of these furnaces for annealing steel at Sheffield. People there, the lecturer said, did not complain of 6000 c.ft. for a natural draught furnace, and 3000 c.ft. with a blast-furnace; but with the type of furnace to which he had been referring, they had got down to 2500 c ft. per ton. Thin steel tubes were being treated at 870° C.; and it was reported that there was no perceptible scale afterwards. There was also a great advantage in the furnace working with a cheap fan. What he had so far been saying applied to steel; but the same principle had been applied to pottery, where an oxidizing atmosphere was required. By regulating the supply of air, it was possible to produce a uniform atmosphere, whether oxidizing or non-oxidizing.

The difficulty which the gas-furnace maker had always to meet arose from people who said, "We have had a gas-furnace, and it is a dead-failure. It is obvious gas is unsuitable for our process." It must be remembered that coal fuel was as old as the hills, whereas gas fuel was a thing of to-day. Problems were being attacked and conquered one by one; and the idea that gas was unsuitable for many kinds of work was gradually fading away. Things impossible for gas to accomplish only five years ago were now a common-place in practice. He believed there was still tremendous scope. What was wanted was patience on the part of the user of gas, and persistence on the part of the furnace manufacturer. With the co-operation of the two, gas was only on the fringe of what it could do. The time would come when gas fuel would be able to accomplish, and to accomplish more cheaply, an enormous number of processes for which coal was at present generally regarded as being foremost.

At the close of the lecture, Mr. S. B. Chandler, at the call of the Chairman (Mr. F. Page Dawson, of Messrs. Wright & Co.), proposed a hearty vote of thanks to Mr. Brayshaw; and this was cordially passed.

EDINBURGH GAS WORKERS' WAGES.

Another Arbitration.

As recently as Feb. 6 [p. 260], it was reported in the "Journal" that Sheriff Louttit Laing, the Board of Trade Arbitrator, had given his award in the matter of the application for increased wages by workmen and others employed by the Edinburgh and Leith Gas Commissioners. The Commissioners have not been allowed to remain long in peace; for on the 9th ult. the Works Committee had another application before them, through the National Union of Corporation Workers, for a further advance in pay. This time a new feature was introduced, in that some of the rental clerks in the Treasurer's Department, having joined the Union, were included in the request. A Sub-Committee was appointed to consider and report on the letter; and they advised the Commissioners to agree to arbitration as to whether the employees dealt with in Sheriff Laing's award of Jan. 29 were entitled to a further rise of wages. As regards the clerks and gas-fitters, it was pointed out that the salaries of the former had as recently as January been increased by a war bonus of £12 a year; and that the latter were paid at the standard rate, less ½d. per hour in respect of holidays and other special benefits. The Sub-Committee recommended that the Commissioners should decline to arbitrate in respect of these men.

On the recommendations coming up for consideration on the 30th ult., Bailie Sutherland and others saw no good reason for these exceptions; and they drew special attention to the case of the rental clerks. The Treasurer (Mr. A. Canning Williams) explained that only eight members of his staff had joined the Union. It was agreed to remit the question of the clerks' salaries to Mr. Williams for consideration and report—the other recommendations being agreed to.

Councillor White raised the point as to whether it was not a fact that the stokers might easily look after a larger number of retorts, and so increase their wages and release some men for national service. He understood that the Secretary of the Union had undertaken to lay this proposal before the men. The Chairman stated that the Sheriff had given a broad hint that those receiving war wages should render war service. The Consulting Engineer (Mr. W. R. Herring) stated that if the retort men desired more wages, they could work more. Somehow, they seemed to be content to do less—probably owing to some idea that, if they worked harder, they would be doing some of their "pals" out of a job.

The Treasurer reported that the quantity of gas sold during the winter quarter showed a decrease of 2·63 p.ct. in quantity and £2506 in value. The sale for the nine months of the financial year was 4·14 p.ct. less than in the corresponding period of 1915-16.

MR. ARTHUR ANDREW'S RESIGNATION.

Fifty-One Years at Oldham.

Mr. Arthur Andrew, the General Manager of the Oldham Gas and Water Departments, has resigned the dual positions, owing to his continued ill-health, after fifty-one years of service. His resignation was intimated to a specially-called Joint Committee meeting last Wednesday, over which Alderman H. Wilde (the Chairman of the Gas Committee) presided.

A little later, at the ordinary monthly meeting of the Council, the

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Standing Orders were suspended to admit the minutes of the Joint Committee meeting. These recorded

That the resignation of Mr. Arthur Andrew, General Manager of the Gas and Water-Works Departments, be accepted with regret.

That this Joint Committee meeting places on record its high appreciation of the earnest, conscientious, and faithful manner in which he has discharged the important and responsible duties that have devolved upon him during the fifty-one years of faithful service with the Corporation.

That the Committee's best wishes be accorded to Mr. Andrew, together with an expression of the hope that a period of rest may effect an improvement of his health, and enable him for many years to enjoy the well-earned retirement.

And that a copy of this resolution, suitably engrossed and signed by the Mayor and Members of the Gas and Water-Works Committee, and sealed with the corporate seal, be forwarded to Mr. Andrew by the Town Clerk.

Alderman WILDE said he was sure the Council would accept the minutes with a very deep feeling of regret. Their sympathy went out to Mr. Andrew and his wife and family, that he was compelled, owing to ill-health, to tender his resignation. Mr. Andrew had always been a very faithful servant of the Corporation. He believed it was the first situation that Mr. Andrew ever had—he started in 1866, at the age of twelve years, and received 4s. per week wages. He was glad to bear testimony to the fact that Mr. Andrew, in his ordinary and business life, had been one of the most steadfast men in Oldham. He was a man who never deviated from the straight path of conduct in any shape or form; and he did not think any corporation ever possessed a better servant. Mr. Andrew was a man with a single purpose, which was wholly devoted to the service of his department. But he was also interested in the welfare of the borough. It had been a difficult matter to get Mr. Andrew to take a holiday. He would have liked to have seen him appointed as consultant; but he felt that he would always be ready to assist them with the benefit of his advice and knowledge. In losing Mr. Andrew, they were parting with a man whose place it would be very difficult to fill. It would require a great deal of consideration by both the Gas and Water Committees before any serious steps were taken. He hoped Mr. Andrew would have many years in which to enjoy his retirement.

Alderman GREAVES (the Chairman of the Water Committee), who seconded the resolution, said Mr. Andrew was not a man of many words; but whenever they asked for information he was ready to give it. A great measure of his success was due to the fact that he always recognized the workmen. By so doing, he had the sympathy and the recognition of every servant under him, and they had always been ready to do his bidding.

The resolution was passed unanimously.

The Leeds Corporation have accepted tenders for gas oil by the Anglo-American Oil Company for 1000 tons at 11⅜d. per gallon, and by the Broxburn Oil Company for 200 tons at 10·07d. per gallon.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *May 7.*

Further business has been reported in pitch during the past week, and the price of 35s. to 36s. net f.o.b. makers' works is well maintained. Creosote is in strong demand, both for Government and other purposes; and for oil sold outside the Government, makers' price is from 4¼d. to 4½d. per gallon net at works. Solvent naphtha is quoted at from 2s. 1d. to 2s. 2d. per gallon net in returnable packages. Other products generally remain unchanged.

A few orders still continue to be placed for sulphate of ammonia for agricultural purposes; but the demand is decreasing.

Tar Products in the Provinces.

May 7.

There is nothing new to report concerning the markets for tar products.

The average values for gas-works products during the week were: Gas-works coal tar, 20s. 3d. to 24s. 3d. Pitch, East Coast, 16s. 6d. to 17s. 6d. per ton; West Coast—Manchester 15s. 6d. to 16s., Liverpool 16s. 6d. to 17s., Clyde 17s. to 18s. Benzol, 90 p.ct., North, 10½d. to 11½d.; 50-90 p.ct., naked, North, 1s. 3d. to 1s. 4d. Toluol, naked, North, 2s. 3d. Coal tar crude naphtha, in bulk, North, 6½d. to 6¾d. Solvent naphtha, naked, North, 1s. 8d. to 1s. 9d. Heavy naphtha, North, 1s. 2d. to 1s. 3d. Creosote, in bulk, North, 3¼d. to 3⅜d. Heavy oils, in bulk, North, 3⅜d. to 4d. Carbolic acid, 60 p.ct., East and West Coasts, 3s. 4d. naked. Naphthalene salts, 80s., bags included. Anthracene, "A" quality, 3d. per unit; "B" quality, 1½d. to 2d.

Sulphate of Ammonia in the Provinces.

LIVERPOOL, *May 5.*

There is no new feature in the position to comment upon; export still being prohibited and the prices for home agriculture continuing to be £15 10s. per ton to middlemen and £16 per ton direct to farmers, net cash, in makers' bags, carriage paid to destinations in the United Kingdom.

Nitrate of Soda.

The market for this material is very strong, in consequence of the scarcity of supplies on spot, and holders now require 25s. 6d. per cwt. for ordinary quality and 26s. per cwt. for refined.

"PIONEERS" OF BLUE WATER GAS.
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MANCHESTER.

COAL TRADE REPORT.

Northern Coal Trade.

The coal trade is quiet; there being a good demand generally. Production appears to be a little fuller, and it is well taken up in the circumstances. In the gas coal trade, there is a full home demand, and a fair inquiry for some of the Continental ports. Best Durhams are steady at from 25s. to 26s. per ton f.o.b.; second-class qualities are rather quiet at from about 16s. 6d. to 18s. 6d.; while for "Wear specials," the quotation is nominally from about 28s. to 30s. The rate of freight is still 20s. to 20s. 6d. per ton, Tyne to London, for gas coal; but fewer steamers seem to be taken up—the contract boats being nearly adequate for the current needs. There is as yet no indication of how far such business may be affected by the Budget provisions as to shipping. It is, however, significant that the quarterly ascertainment of the prices of coal in the County of Durham led to the retention of present rates of wages for another quarter, though the recent tendency of these aggregate prices has of late been towards ease. Good gas coke is quoted at 32s. 6d. per ton f.o.b. in the River Tyne. Coke freights are still based on 45s. to 45s. 6d., Tyne to northern ports of France.

Wages at Halifax.—A Special Committee of Chairmen and Vice-Chairmen of the Halifax Corporation Committees employing Labour, recommend that the wages of all male employees (other than clerical staff), with the exception of men employed in the Tramways Department, be advanced, as from April 1 last, to such an amount as will bring the rate, together with bonus, to 8s. per week above the respective rates before the war; that a Sub-Committee be appointed to consider overtime and Sunday pay; and that the Finance Committee be requested to endeavour to arrange a conference with representatives from the Corporations of Leeds, Bradford, Huddersfield, and Halifax on the question of wages.

Fatal "T.N.T." Poisoning.—It was stated at an inquest on the body of a munition worker, Elizabeth Macey, aged 20, who had been employed at a North London factory, that, as required by the regulations, on alternate periods she had been engaged in filling bags with "T.N.T." and in making the bags. In January, she was examined by the factory doctor, and ordered to stay away from work, but disobeyed till illness compelled her to be absent. Dr. Gregorson attributed death to toxic-jaundice following "T.N.T." poisoning; and he said her bad teeth had probably rendered her more liable to poison. The Manager of the factory stated that he had several employees who had been working on "T.N.T." for two years; and they were in perfect health. The doctor added that the girl's mother, who had worked at the same factory, was in the infirmary suffering from "T.N.T." poisoning; and she, too, had defective teeth. The Manager pointed out that the women employed on this class of work were strongly urged to have their teeth attended to. Many, however, ignored the advice.

The Lights of London.—Last Monday, the Standing Joint Committee of the Metropolitan Borough Councils declined to support the movement for abandoning street lighting, but decided to make representations to the authorities in favour of a restricted but uniform system of lighting throughout the whole of London.

The Leiston Lighting Case.—The Executive of the Urban District Councils Association have considered what grant shall be made towards the costs incurred by the Leiston-cum-Sizewell Urban District Council in the action brought against the Council by the Leiston Gas Company. It was stated that the taxed costs of the Company payable by the Council, both in the King's Bench and the Court of Appeal, amounted to £166, and that the costs of the Council were £160 or £170. The Executive voted a contribution of £31 10s.

Curtis's and Harvey, Ltd.—At the general meeting of the Company last Tuesday, the Chairman, Colonel C. H. Curtis, said that the Directors had carefully looked into the accounts for last year, and, as far as they were able to judge, were satisfied that they were justified in recommending the payment of a final dividend of 5 p.ct. and a bonus of 10 p.ct., both less income-tax; making the total distribution for the year 20 p.ct., equivalent to 12½ p.ct., less income-tax, on the original capital of the Company. Their position to-day was much the same as it was when they last met. They were now manufacturing considerably larger quantities of material for national purposes; but their normal business had again suffered to a very considerable extent. The Directors had purchased an incandescent gas-mantle factory, which was known as the British Incandescent Mantle Works, Ltd., though it was in reality a German Company. The factory was well equipped in every way, and capable of a considerable output. They were now the largest manufacturers of gas-mantles in England, and had reason to hope the investment would be a valuable asset to the Company's business.

Chemical Industry of Japan.—One of the most remarkable features of the economic development of Japan, says the "British Trade Review," is her extraordinary progress in the chemical industry. At the commencement of the war, this industry was still in its infancy; yet to-day Japan is exporting chemical products for the supply of which she was but three years ago almost entirely dependent upon outside sources. Among many other things, Japan is making sulphate of ammonia from bye-products of the gas and coke factories, and from nitrogenous lime. The Tokyo Gas Company are making carbolic acid; and the Japan Dyestuff Company have laid plans for manufacturing it from benzol. The yearly production of sulphuric acid in Japan is little short of 750,000 tons; and it is intended to establish plant for the production of this acid by the contact process. As to the dyestuffs industry, the Japan Dyestuffs Manufacturing Company has been founded, and is backed by the Government. Before the war, Japan imported from Germany coal-tar colours to the value of something approaching a million pounds sterling; and, although the Japanese industry is still in its infancy, it is quite clear that Japan does not intend to go on paying such a tribute to Germany.

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Australian Welsbach Company.

Questions relating to the constitution of the Welsbach Company of Australasia, Limited, were, says the "Melbourne Age," recently asked in the Australian House of Representatives, and replied to by the Prime Minister. Mr. Hughes explained that in September, 1915, the concern was proclaimed as a Company with whom trading was prohibited. The Sydney and Melbourne Managers of the Company were now shareholders and Directors of a newly-formed Company, called the Lighting Supplies Proprietary, Limited. The Memorandum and Articles of Association of the new Company were submitted to the Attorney-General, and contained provisions which satisfied him that the capital and composition of the Company would be wholly British, and under British control. The Attorney-General had authorized the acquisition by the new Company of the British made stocks of the Welsbach Company. No steps had been taken to insist upon the mantles held by the new Company, and obtained from the Welsbach Company, being effectively relabelled; and no action had been taken to recall advertising matter regarding Welsbach goods. The sole reason for placing the Australian Welsbach Company on the list of enemy firms was that a controlling interest in the Company was purchased a few years ago by a firm trading in England who were themselves on the list. The facts as to the advertising of the Welsbach Company by the new Company were being inquired into, for the purpose of ascertaining whether anything was being done which could in any way benefit enemy trade directly or indirectly.

Bombay Gas Company, Ltd.—At the meeting of the Company on Thursday, the 17th inst., the Directors will report that the profit for the year ended Dec. 31 last, as shown by the net revenue account, after allowing for interest and exchange, amounts to £28,985, making, with £9791 brought forward from the preceding year, £38,776 available for dividend. Deducting the interim dividend paid in November last (£8400), and placing £843 to the reserve, there remains £29,533, out of which the Directors recommend a dividend of 4½ p.ct. (less income-tax), making 7½ p ct. for the year. This will leave £16,933 to be carried forward to the current year.

South Metropolitan Company's War Bonus.—In an official notice issued last month over the signature of Mr. F. M'Leod, the Secretary of the South Metropolitan Gas Company, it was stated that the Directors had again decided to follow the precedent set by the Government in the case of the railways, by increasing the war bonus to the following rates, in all cases for seven days per week: Males: Those of 21 years of age and over, 2s. 2d. per day. Those of 18 and under 21 years of age, 1s. 6d. per day. Those under 18 years of age, 1s. per day. [These regulations do not apply in the case of workmen specially engaged for the construction of works for Government purposes.] Females: Those of 21 years of age and over, 1s. 5d. per day; 18 and under 21, 1s. per day; under 18, 7d. per day.

Gas Questions at Burnley.

The Burnley Town Council, at their meeting last Wednesday, passed a resolution in the Gas Committee's minutes—"That the Sub Committee do inquire into, and report upon, the organization of the gas-works." A long debate took place upon the following question, of which notice had been given: "Is it a fact that the contract entered into in February, 1915, for 3000 tons of gas oil at 3d. per gallon was not all received; and what was the price of the new contract entered into in 1916?" Mr. Sutcliffe (who put the question) said he would like the Chairman to say what was the total loss by difference in price on the quantity undelivered. Mr. Brumbley also said he had given notice asking if the Chairman still adhered to his statement that Burnley made gas as cheap as, or cheaper than, Sheffield, Widnes, or any other place, in face of the correspondence in the "Gas Journal," and what was the working cost of the manufacture per 1000 c.ft. in Burnley. Mr. Lees thought the latter part of the question might prejudice the inquiries of the Sub-Committee. Alderman Emmott said he still adhered to what he said in the Council Chamber on March 7 and April 4. As an attack had been made on the management of the gas-works, he said that, given coal and residual products at the same price, they could make gas at the Burnley works as cheaply as at any works. At the present moment, they were under extraordinary conditions owing to the war; and one works might be much better placed than another. He adhered to his general statement that the Burnley works could make gas as cheaply as anywhere else. As to oil, in October, 1916, the Corporation entered into another contract for the supply of 1000 tons at 9¾d. per gallon. If the Corporation had had the power on the first contract to claim the undelivered part of the 3000 tons at 3½d., of which 1500 tons had been delivered, there would have been a saving on 1500 tons of 6¼d. per gallon, which worked out at about £10,000. Making the first contract when they did at 3½d. per gallon, they got the oil at a less price than they would have done later; and he claimed they had saved the ratepayers many thousands of pounds.

Wandsworth Gas Company's Charge.—At a meeting of the Wandsworth Ratepayers' Association, Mr. W. F. Robertson, the Secretary, reported that he had been in communication with the Wandsworth, Wimbledon, and Epsom Gas Company with regard to their recent announcement of an increase in the price of gas. The Company had replied stating that the advance was due to the greatly enhanced cost of their raw materials—of which coal was, of course, the principal constituent—and the serious difficulties connected with transport. The dividends to the shareholders were fixed by law on a sliding-scale, under which any increase in the price of gas meant a corresponding reduction in the rate of dividend. Customers could therefore rest assured that it was to the interest of all to keep the price charged for gas as low as they could, and that it would be reduced as soon as such a course was possible.

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MANCHESTER. NOTTINGHAM.

A Question of Rating.—At the Ballyjamesduff (co. Cavan) Petty Sessions, William Lynch declined to pay £2 2s. poor rate, because the lighting rate was included; and at the Petty Sessions, on being sued, he stated that he still refused to pay, as a protest against the non-lighting of the lamps last winter. The Magistrate said he quite understood defendant's position; but when the assessment was for the amount claimed, he was bound to give a decree. He would, however, give no expenses. Of course, defendant had his remedy in another Court, if he cared to seek it. Lynch said he would seek it. Meantime, he paid the amount of the decree.

Curtailed Street Lighting at Bradford.—Bradford people have complained a good deal during the past winter about the street lighting being more severely restricted than in many towns. They have some consolation now in learning, from the Finance Committee's estimates for the coming year, that the past year's expenditure has been £10,000 less than the estimates, the chief cause of which has been the decrease of public lighting. At the beginning of the past year, it was noted that only £12,000 had been paid to the Gas Committee for public lighting, as compared with £26,000 in the previous year. Knowing that the restrictions were to continue, the Committee took a mean between the two for the ensuing year, and now the city learns of a big saving even on this figure.

Compensation Case at Dublin.—The Recorder of Dublin granted £15 compensation to P. Farrell, a labourer, under the Workmen's Compensation Act, in respect of injury caused to his right foot by a block of wood falling on it during his employment with the Alliance and Dublin Consumers' Gas Company. A bone was broken, it seemed; and for being unable to attend to his work, the Company allowed him 10s. 1½d. per week until December, when they decided that they thought him fit for work. When Farrell offered to do "light work," the Recorder asked him for a definition of the term, and, in reply, he said he could "sweep the yard," but "could not do anything heavy."

The Economy of Coke.—The Deptford Borough Council introduced apparatus for burning coke in the bath-boilers, and now report the following result of a year's working: The cost of coal for twelve months from March, 1915, to March, 1916, at the current price of coal, would have been £1792 12s. 5d. The cost of coke from March, 1916, to March, 1917, has been £1444 0s. 7d—amount saved, £348 11s. 10d. The saving would have been greater but for the large increase in the heating and lighting of the buildings owing to the very cold and dark winter, and to the increase in the number of warm baths used. The saving, despite the adverse circumstances, has exceeded the estimate.

STOCK MARKET REPORT.

Things on the Stock Exchange last week went better after the wholesome steadying that was administered the week before. Though business was rather too quiet, markets were healthy and firm. The main spring of action was, of course, the Budget. Rumours and apprehensions in advance had been rife. The gilt-edged market was forecasting the chances of an advance in the income-tax, and rather quivered at the thought of impost duties and special burdens. So when the financial mountain in labour was delivered of a mouse on Thursday, there was satisfaction in the City. The Stock Exchange had but one business day thereafter; but it was sufficient for the business of markets in general to be consolidated.

Government issues were in excellent case. The War Loan steadily crept up until on Friday it attained 94½ *ex div.* Other Home issues were strong, and Colonials were in good request. Home Rails were much neglected and took no part in the general move. Americans were rather dull, and Canadians were quiet with their fortunes in the pot of the Railway Commission. Argentines were fair; but they want better traffics. South Africans were firm. The Foreign Market was quite bright. Brazilian gathered strength with the advancing exchange and improved financial outlook. Russian, Chinese, and Japanese were in demand, and French were firm.

Business in the Gas Market was pretty fair in point of volume, considering that there were only four working days to the London Stock Exchange week, and having regard to what the nowadays average of transactions is. The general tone was quite favourable; changes in quotation being uniformly for the better, with only one exception, which is the victim of special war troubles. Following upon what the Chairman of the Primitiva Company was able to announce to the proprietors at the annual meeting on Tuesday, the ordinary and the preference shares effected a moderate recovery. The Imperial Continental Gas Association, however, which held theirs the same day, were not so fortunate, and the stock dropped to 82 on Friday. In the Money Market, the position was quite easy.

Bargains done for cash during the week were as follows: On Monday, Brighton and Hove "A" 104, 104½, British 33¼, Gas Light ordinary 72⅜, Imperial Continental 87½, Oriental 107, Primitiva 35s. 6d., ditto preference 55s. 7½d., 57s. 6d., South Suburban, 77. On Wednesday, Brentford "B" 81, Brighton and Hove "A" 103½, British 33⅛, Gas Light ordinary 72, 72⅛, 72⅜, 72⅝, 72⅞, 73, ditto maximum 56⅜, ditto preference 72⅛, ditto debenture, 56, 56½, 56⅜, Imperial Continental 87, Oriental 106½, 107, Primitiva 40s., 44s. 9d., South Suburban 77½. On Thursday, Bournemouth 10 p.ct. 25½, Gas Light ordinary 72, 72⅛, 72¼, 72⅝, ditto preference 73, Imperial Continental 85⅛, 87. South Metropolitan 76½, South Suburban 77½, ditto West Kent 60, 60¼. On Friday, Bombay 5 1/16, British 33⅛, Bournemouth 10 p.ct. 25½, Gas Light ordinary 72⅛, Hastings debenture 52½, 53, Imperial Continental 82, 83½, 85, Kingston 74⅜, 75, Monte Video 8⅜, Primitiva preference 67s. 6d., South Suburban 77¼. The London Stock Exchange was closed on Tuesday and Saturday.

The Bank rate is 5 p.ct., as fixed on April 5.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue.	Share.	When Dividend.	Previous Div or Dividend and Bonus.	Last Dividend.	NAME.	Closing Prices. July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
£			p.c.					
175,472	Stk.	Mar. 10	4	4%	Aldershot 4 p.c. Pref.	..	53–63	..
1,551 868	,,	April 8	2½	5⅛%	Alliance & Dublin Ord.	59–64	60–62	..
874,000	,,	July 10	4	4%	Do. 4 p.c. Deb.	76–79	58–63	..
280,000	5	April 29	7½	4/6	Bombay, Ltd.	5⅞–6⅛	5–5⅛	5 1/16
50,000	10	Feb. 26	16	15/-	Bournemouth Gas and Water { 10 p.c.	24–30	24–26	25½
383,110	10	,,	7	7/-	B 7 p.c.	15–15½	10¾–11¼	..
115,000	10	,,	6	6/-	Pref. 6 p.c.	13½–14	9¼–9½	..
159,740	—	—	—	4%	4 p.c. Deb.	..	71–73	..
992,045	Stk.	Feb. 26	14	55/-	Brentford A Consolid.	261–266	83–85	..
734 920	,,	,,	11	53/9	Do. B New	204–209	80–83	81
55,000	,,	,,	5	5%	Do. 5 p.c. Pref.	109–111	84–88	..
221.400	,,	June 11	4	4%	Do. 4 p.c. Deb.	91–93	67–69	..
217 380	,,	Feb. 26	11	10%	Brighton & Hove Orig.	208–213	150–155	..
244,200	,,	,,	8	7%	Do. A Ord. Stk.	154–159	102–1 7	103½–104½
530 000	20	Mar. 26	12½	22/6	British	44–45	33–34	33¼–33½
120,000	Stk.	June 26	4	4%	Do. 4 p.c. Deb. Stk.	88–90	66–68	..
215.771	,,	,,	4	4%	Buenos Aires 4 p.c. Deb.	85–87	57–60	..
100,000	10	—	—	—	CapeTown & Dis., Ltd.	1½–2½	1¼–1½	..
100.000	10	—	—	4½%	Do. 4½ p.c. Pref.	4–6	4⅜–5¼	..
100,000	Stk.	June 26	4½	4½%	Do. 4½ p.c. Deb. Stk.	70–75	60–65	..
157.150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord.	108–110	79½–80½	..
1,513,280	,,	Feb. 12	5/9/4	49/4	Commercial 4 p.c. Stk.	106–108	72–74	..
560 000	,,	,,	5½	46/8	Do. 3½ p c. do.	103–105	6½–68	..
475,000	,,	June 11	3	3%	Do. 3 p.c. Deb. Stk.	69½–71½	52–54	..
800,000	,,	,,	4	—	Continental Union Ltd.	76–79	38–40	..
200,000	,,	,,	7	—	Do. 7 p.c. Pref.	115–118	58–60	..
278,400	—	—	—	11½%	Croydon B and C 7 p.c.	..	170–180	..
—	—	—	—	10%	Do. E	..	..	..
492,270	Stk.	—	6	5½%	Derby Con. Stk.	123–125	95–100	..
55 000	,,	—	4	4%	Do. Deb. Stk.	102–104	80–83	..
1,012,180	10	July 29	10	7/6	European, Ltd.	17½–18	12–13	..
16 313 430	Stk	Feb. 10	4/17/4	42/-	Gas Light and Coke { 4 p.c. Ord.	98–102	7.–74	72–73
2,600 000	,,	,,	3½	3½%	3½ p.c. max.	76–79	56–58	56½
4,052,235	,,	,,	4	4%	4 p.c. Con. Pref.	96–99	72–74	72½–73
4,674 850	,,	June 11	3	3%	3 p.c. Con. Deb.	72½–74½	55–57	56–56½
130.000	,,	,,	10	10%	10 p.c. Bonds	..	..	..
2 8,740	,,	Mar. 12	5	4½%	Hastings & St. L. 3½ p.c.	87–89	76–81	..
70 000	10	April 29	11	6%	Hongkong & China, Ltd.	16½–16⅝	8–9	..
86,600	—	—	—	9½%	Hornsey 7 p.c.	..	120–130	..
131,000	Stk.	Mar. 12	7⅞	7⅞%	Ilford A and C.	151–154	102–107	..
65,780	,,	,,	6⅜	5⅞%	Do. B	115–118	80–85	..
65,500	,,	June 26	4	4%	Do. 4 p.c. Deb	92–94	71–74	..
4,910,000	,,	May 14	9	4½%	Imperial Continental	150–160	82–87	82–87½
1,235,000	,,	Feb. 12	3½	3½%	Do. 3½ p.c. Deb. Red.	84–86	62–65	..
235,242	,,	Mar. 12	6½	6½%	Lea Bridge Ord. 5 p.c.	119–121	85–90	..
2,498,905	,,	Feb. 26	10	5%	Liverpool 5 p.c. Ord. { A	211–213	82–84	..
					{ B	146–148		
306,083	,,	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	..	72–74	..
75,000	5	June 11	6	2/-	Malta & Mediterranean	4⅛–4⅜	3⅞–4⅛	..
250,000	100	April 1	4½	4½%	Met. of Melbourne { 4½ p.c. Deb.	99–101	88–98	..
541,920	20	May 28	4	6/-	Monte Video, Ltd.	11½–12	8–8½	8⅜
1,875,892	Stk.	July 29	4½	4½%	Newcastle&Gatsh'dCon.	98½–99½	71–72	..
529,705	,,	June 26	3½	3½%	Do. 3½ p.c. Deb.	82–83	73–75	..
55,940	10	Feb. 26	7/14/0	7/9	North Middlesex 7 p.c.	14–15	10–11	..
300,000	Stk.	May 14	8	8%	Oriental, Ltd.	117–122	106–108	106½–107
60,030	5	Mar. 26	10	1/-	Ottoman, Ltd.	7¼–7⅜	2–3	..
60.000	50	Feb. 26	13	12%	Portsea, Island B	128–131	92–97	..
100,000	50	,,	12	11%	Do. C	118–121	85–90	..
52,000	50	,,	10	9%	Do. D	..	..	..
249,980	5	April 29	8	—	Primitiva Ord.	5¼–6	2–2¼	85/6–44/9
499,960	5	June 26	5	2/6	Do. 5 p.c. Pref.	4⅜–5	3–3½	55/7½–67/6
521,600	100	June 2	4	4%	Do. 4 p.c. Deb.	91–93	78–80	..
—	—	—	—	4%	Do. ,, ,, 1911	..	..	..
346,198	Stk.	June 26	4	4%	River Plate 4 p.c. Deb.	85–87	61–67	..
150,000	10	May 14	6	6/-	San Paulo { 6 p.c. Pref.	10¾–11	7⅞–8¼	..
125,000	50	July 1	5	5%	5 p.c. Deb.	47–49	42–44	..
135,000	Stk.	Mar. 12	10	10%	Sheffield A	223–224	1 5–180	..
209,984	,,	,,	10	10%	Do. B	222–224	175–180	..
523 500	,,	,,	10	10%	Do. C	220–222	175–180	..
90,000	10	May 28	9	6/-	South African	10¼–11½	..	..
6,609,895	Stk.	Feb. 10	5/4/0	46/8	South Met. 4 p.c. Ord.	111–113	77–79	76½
1,895,445	,,	July 10	3	3%	Do. 3 p.c. Deb.	72½–74½	56–58	..
224,820	,,	Feb. 26	8½	8%	South Shields Con. Stk.	157–159	140–142	..
952,795	,,	,,	6	48/4	S'th Suburb'n Ord. 5 p.c.	114–116	7 –78	77–77½
60,000	,,	,,	5	5%	Do. 5 p.c. Pref.	110–112	77–79	..
135.000	—	—	—	48/4	Do. West Kent	..	..	60–60½
187,558	Stk.	June 26	5	5%	Do. 5 p.c. Deb. Stk.	116–118	88–90	..
647,740	,,	May 14	5	5%	Southampton Ord.	99–102	77–79	..
120.000	,,	Feb. 12	7½	7½%	Tottenham { A 5 p.c.	135–138	95–100	..
782,275	,,	,,	6	5⅝%	District { B 3½ p.c.	115–117	68–73	..
181 255	,,	June 26	4	4%	4 p.c. Deb.	87–89	65–67	..
182,380	10	Dec. 30	5	—	Tuscan, Ltd.	5–6	1–2	..
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93–95	60–65	..
236,476	Stk.	Mar. 12	5	5%	Tynemouth 5 p c. max.	103½–109½	89–91	..
32,000	,,	Feb. 26	8⅜	80/-	Wandsworth, Wimbledon, and Epsom— Wandsworth A 5 p.c.	151–156	114–119	..
255 636	,,	,,	6⅝	65/-	Do. B 3½ p.c.	129–134	99–101	..
108,075	,,	,,	5/17/3	56/-	Do. C 3½ p.c.	110–115	86–91	..
352,000	,,	,,	6½	58/9	Wimbledon 5 p.c.	117–129	88–98	..
98,000	,,	,,	6½	65/-	Epsom 5 p.c.	121–126	96–101	..
88,416	,,	June 26	3	3%	3 p.c. Deb. Stk.	66–69	51–54	..